

DEPOSITORY

EXPORT POLICY

HEARING
BEFORE THE
SUBCOMMITTEE ON INTERNATIONAL FINANCE
OF THE
COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE
NINETY-FIFTH CONGRESS
SECOND SESSION

PART 8
OVERSIGHT ON FOREIGN BARRIERS TO U.S. EXPORTS

MAY 17, 1978

Printed for the use of the Committee on Banking, Housing, and Urban Affairs



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OVERSIGHT ON FOREIGN BARRIERS TO U.S. EXPORTS ¹

WEDNESDAY, MAY 17, 1978

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
SUBCOMMITTEE ON INTERNATIONAL FINANCE,
Washington, D.C.

The subcommittee met at 10 a.m. pursuant to notice, Senator Adlai E. Stevenson (chairman of the subcommittee) presiding.

Present: Senators Stevenson and Schmitt.

OPENING STATEMENT OF SENATOR STEVENSON

Senator STEVENSON. The subcommittee will come to order. Today we conclude our review of U.S. export policy by examining foreign barriers to U.S. exports.

More than 3 months ago this subcommittee began the first comprehensive study by the Congress of U.S. export performance and export policy. We have examined the floating exchange rate system, the changing complexion of national and international markets, the adequacy of U.S. marketing and financing facilities, the technological challenge from foreign competitors, and the barriers, explicit and implicit, against U.S. exports, as well as many other conditions which have diminished our ability to compete in the world.

Some of these conditions can be addressed through unilateral U.S. action. Increased funding for research and development, a review of antitrust policy, and the reduction of those barriers we have imposed against our own exports fall within this category. Expansion of U.S. exports also requires the Eximbank, DISC, and similar export promotion legislation, and there, too, we can act, but in no instance, I hope, impose export subsidies or import protection.

Today's witnesses understand the reciprocal nature of trading relationships and the impossibility of developing an export policy from one side. The Tokyo round of GATT negotiations and bilateral trade negotiations cannot be analyzed this morning. We can however, develop a better understanding of the framework of U.S. trading relationships within which export policy can be developed. We can garner a better insight into the barriers abroad that frustrate U.S. exporters.

The subcommittee will review the testimony we receive today and have received over the past 3 months, and then prepare a report containing findings and suggestions. A parallel effort has begun in the administration. The subcommittee intends to hold hearings after the

¹ This is part 8 of an eight part series of hearings on U.S. export performance and export policy. The hearings form part of a subcommittee study which will serve as a basis for recommending action needed to insure the competitiveness of U.S. agriculture and industry in world markets.

results of both these studies are public. After comment, I hope we will act at last to make exports a centerpiece of American economic policy.

We are fortunate to have with us this morning Ambassador Wolff, Deputy Special Representative for Trade Negotiations. I am grateful to him for joining us this morning, and I will invite him, as I will all of our witnesses, to summarize their statements, and if summarized, the full statements will be entered into the record.

STATEMENT OF ALAN W. WOLFF, DEPUTY SPECIAL REPRESENTATIVE FOR TRADE NEGOTIATIONS

Mr. WOLFF. Thank you very much, Mr. Chairman. I appreciate very much this opportunity to discuss with you the problem of foreign barriers to U.S. exports and the actions being taken by the Government to reduce such barriers. I will summarize my statement.

The recent developments in the national economy have acted to increase protectionist pressures throughout the world. These protectionist pressures have increased due to two rather substantial economic factors: the increase in oil prices in 1974 and the attempts of countries to deal with their oil-related imbalances, as well as the economic recession experienced throughout the world since 1974, a recession which the United States is recovering much more quickly from than our trading partners.

The London Economist magazine carried what I thought were some interesting statements in this regard. It noted that the 3 last years of stagnation have taken their toll on European governments' self-confidence. Throughout Europe, unemployment is higher than it was a year ago, 1978 offers only slow growth, and 1979 bleak uncertainty. In West Germany, France and Britain employment is lower than the bottom of the 1974-75 recession. The U.S. economy on the other hand has had a net increase of 3½ million jobs last year, and nearly 9 million extra jobs have been added to the work force since 1975. This relative growth in the United States compared with our major trading partners has been reflected in our trade balance. Our own exports have lagged, partially as a result of these factors, and we have an enormous trade deficit that extends beyond the problem of oil. This deficit, coupled with trade problems and increased protectionist sentiment in other nations, has not only increased calls for protectionism in the United States, but has made the trade barriers faced by U.S. exporters a topic of serious concern within the United States.

It is this situation I will address today. The GATT Secretariat has estimated that in the last 3 years an additional \$50 billion of restrictions have been imposed on world trade. I regard that figure as really comparatively small, given the enormous pressures countries have been under to finance their oil deficits and to meet problems of unemployment caused by the recession.

Nevertheless, there has been a rapid expansion in the cases that are brought abroad and domestically for import relief and for other forms of protection against unfair or injurious import practices.

Daniel Minchew, Chairman of the U.S. International Trade Commission, recently noted that while the United States only had some few hundred million dollars' worth of trade cases in 1975, the estimate for 1978 is \$28 billion in trade cases before the Commission. This case-load represents a reaction to import pressures.

There has been a reaction abroad as well. However, I would say that our own actions have been very restrained, and the import reactions of Europe and Japan have also been very restrained. In Europe, the main pressures have been felt, as here, in textiles and steel, but there have not been widespread protectionist actions in the industrialized world in the last few years. There are quite a wide variety of measures that can be taken, and have been, to limit the access of U.S. exports to foreign markets. The most common, traditional import measure is the tariff. The average tariff in industrialized countries is now low as a result of six major rounds of trade negotiations since World War II. The present tariffs faced by U.S. exporters of industrial products in Japan average 7.5 percent, 8.8 percent in the nine common market countries of Europe, and 14.4 percent in Canada. These averages are somewhat misleading, because in particular instances there are rather high tariffs on individual products; for instance, computers; color film in Japan. There are numerous high Canadian tariffs. The Canadian average tariff contains in it a great deal of duty-free trade. Where there are tariffs, the tariffs tend to be much higher than our own.

There is, for example, a 15-percent tariff on cars, not applicable to us, because of the Canadian-United States auto agreement, compared to our own 3-percent tariff.

But that is the kind of disparity that often exists in Canada.

European tariffs, are also often quite high, although the EC's tariff profile is flatter than is that of the United States. These high tariffs are a major barrier to our trade in a market of some 300 million people in Europe. The free trade area includes both the European Common Market and the other European free trade area countries, resulting in discrimination against U.S. exporters as compared with any of the EFTA or EC member state producers.

Thus, there is still a substantial problem with tariff barriers. As I have mentioned, computers, photographic equipment, color film, and also construction equipment and paper products, particularly paper products into the European Community, face a great deal of tariff discrimination, and we feel that some substantial gains could be made in those areas if tariffs were substantially reduced.

Tariffs in developing countries, as opposed to the industrialized world, are often prohibitive. One example is a 206-percent tariff on denim fabric which we could export to Brazil, and the Brazilians are not alone in maintaining extremely high tariffs. Most developing countries do. As tariffs have been reduced, other nontariff barriers have become relatively more significant. There is an extraordinarily wide variety of nontariff barriers. Some are erected intentionally as specific barriers to trade; others are an unintended outgrowth of domestic policy decisions made without regard to trade.

Most frequently complained of nontariff barriers include Government procurement regulations, product standards, customs procedures, quantitative restrictions such as quotas and embargoes, and export subsidies.

With respect to Government procurement, most foreign markets are closed. We also discriminate against foreigners. We have the Buy America domestic procurement preference of 6, 12, or 50 percent, depending on the type of procurement, but we publish our regulations,

we publish our bids, and generally speaking people know when a purchase is being made by the U.S. Government.

Abroad this is not generally true. Foreign governments do not publish bids, they don't tell you who won, what they did. So it is difficult to participate even if it is technically possible to do so.

There may be as much as a \$20 billion procurement market that is closed to U.S. exporters, and the foreign government procurements are much greater than our own in terms of the types of products covered. Foreign governments control railroads and airlines, as opposed to the situation in the United States. The telephone networks abroad and utilities are generally publicly owned rather than privately owned. So government procurements abroad are rather substantial, almost an insuperable barrier to trade right now. Procurement is also used as a hidden subsidy for research and development of power equipment, as a means of regional policy to give contracts to stimulate employment in particular areas of the country.

Government procurement is really a very serious barrier to trade involving an area of what is generally considered a matter of national sovereignty. It will therefore be particularly difficult to deal with in our negotiations.

Some of the main areas of our exports that are affected adversely by the closed nature of foreign procurement by governments include power generation equipment, nuclear reactors, communications equipment, scientific and controlling instruments, computers, chemicals, and, in the United Kingdom and France, aerospace equipment.

Product standards are another major area of foreign barriers to trade. Many of these standards are consumer-oriented such as health and safety requirements, advertising requirements. Others are aimed at controlling methods of production for environmental reasons or safety reasons. But standards can be an absolute barrier to trade.

Some examples include the fact that the Japanese don't allow us to use a particular fungicide called TBZ. They now allow us, after several years of negotiations, to use one other fungicide (OPF). The net effect is that our fruit was rotting as it crossed the Pacific.

Now, is that a restriction maintained for the public health and safety reasons? It is hard to say. The Japanese consumer agency felt the fungicide would have an adverse effect on health. The fungicide, however, was used within tolerances established internationally under the World Food Organization and the question is: Is it a nontariff barrier, or a health restriction?

We think we are making progress in that area, and will be able to move in that area over time. There are many other kinds of trade barriers, some of them rather curious. We can't advertise bourbon in France. It is made from grain, and spirits made from grain are known by the French to be injurious to the health. However, cognac can be advertised, as it is made from grapes and good for the health. Is that a nontariff barrier? We would say so, but the French would say it is a health restriction.

The French insist that when pharmaceuticals are manufactured that there be a French inspector in the plant during the manufacturing process. It is an unfortunate fact that these inspectors don't travel abroad, outside of France. This tends to create an embargo with respect to pharmaceutical trade, because we can't ship if we haven't had the inspector there, and he won't leave France.

So is that a health restriction? Is it reasonable? We say no, because other conditions could have been established, certification during the manufacturing process could have been devised, and trade would have been allowed, but there has been no ability to reach an accommodation on that particular subject to date. We hope to do so in the multilateral trade negotiations.

A good example of a problem one runs into in the standards area is a case we had with Canada a couple of years ago with the use of hormones in feeding beef. The U.S. Food and Drug Administration banned the use of the DES hormone for use in beef. The Canadian consumers brought pressure on the Canadian Government to follow suit because the hormone was considered injurious to human health in the consumption of beef, so the Canadians banned the use of DES. Then the courts struck down the U.S. ban on procedural grounds and our producers could use the hormone again. The Canadians embargoed our beef, saying they couldn't tell whether this beef contained the hormone or not. We negotiated for 6 months or longer a certification procedure to show that we had not used the hormone. Once that certification procedure was in place, the Canadians placed an import quota on our beef immediately. So the problem was not primarily the use of the hormone, but the fact that our beef was going north of the border in quantities the Canadians would prefer not to have.

Well, obviously it is difficult to quantify what additional trade would occur in the absence of certain standards or if they were changed or harmonized. But our pharmaceuticals, our scientific controlling instruments, our specialty agricultural products—including wine that faces complex labelling requirements—could probably be shipped in largely increased quantities if we could reduce foreign product standards or provide some procedures as to how they would be applied.

Customs regulations are obviously a barrier to trade. One can make the forms numerous enough and the procedures complex enough to discourage the most hearty of exporters.

Export subsidies present if anything a more complex problem and are more difficult to deal with. Subsidies are used in increasing numbers, and have been increasing in variety. These subsidies are no longer simply export subsidies. I know Frank Moore testified and he faces a good deal of competition from foreign export-import banks. But there are many less visible subsidies such as those which are ostensibly regional aid policies designed to cure unemployment problems in particular areas.

There are cash capital grants to companies, also designed for social and regional aid purposes. But they do have a trade effect and are increasingly distorting world trade and will be a major growth area of nontariff distortions to trade in the future.

In particular, the chemical, plastics, railroad equipment, and communication equipment industries are facing increasing problems in this area. The Japanese Government has just announced an infusion of grant aid to a consortium of computer firms for research and development—that probably couldn't exist under our antitrust laws if U.S. manufacturers chose to get together in that way.

Our agricultural exports are also facing problems with subsidies in wheat, barley, and a number of areas, because this is a means for other countries surplus disposal abroad.

Well, there are an enormous number of other nontariff barriers that don't fall easily into any particular category, including discretionary import licensing of developing countries and state trading companies. An illustration of the latter barrier is the Japanese tobacco monopoly. The number of brands of cigarettes they carry is a government corporation's decision. There is little ability for foreign brands to compete, or affect that decision very easily.

The multilateral trade negotiations is a major attempt to deal with nontariff barriers in a meaningful way for the first time. In the past, we tried in a few instances to deal with specific nontariff barriers on a case-by-case basis with very little success. We are now taking a comprehensive approach, in government procurement, customs valuation, product standards, and subsidies. We are attempting to put codes of conduct into place for each of these subjects.

My testimony outlines the progress we are making in those areas.

Cooperation among governments has been superb, particularly at the top level. The heads of state are thoroughly in back of these negotiations, supporting them.

It is very difficult to make progress in some of these areas. I mentioned government procurement, which involves an area in which even the nine member states of the European Common Market couldn't agree on opening up their markets fully to each other. But there is an enormous export potential, I think, that can be realized through reduction particularly of nontariff barriers for both industrial and agricultural products.

You asked me to comment also on our import restrictions. I think that we have so far managed to make it through a very difficult time with a minimum of restrictions, either here or abroad. In footwear, televisions, steel and CB radios, we have taken some rather limited actions after a massive increase in imports in a very short period from a few exporting countries—for footwear, Taiwan and Korea.

In the television case, again there was a massive increase in 1 year, from a flat 1.1 million sets a year from Japan in 1971-75 to 2.9 million sets in 1976. Some action had to be taken in that case to preserve our domestic television industry and give it time to adjust. In steel, the trigger price mechanisms is, I believe, a very restrained response to widespread dumping in this market by Europe and Japan.

So the commitment remains strong to liberalize the trading world. The difficulties are enormous; it is a terrible time to try to negotiate trade liberalization when countries would like to go in the opposite direction. But there is really very little choice. Countries must liberalize their trade restrictions.

That concludes my prepared testimony, and I will be glad to answer any questions you may have.

[The complete statement of Mr. Wolff follows:]

STATEMENT OF AMBASSADOR ALAN WM. WOLFF, DEPUTY SPECIAL TRADE
REPRESENTATIVE

Mr. Chairman, members of the subcommittee, I appreciate this opportunity to discuss with you the problem of foreign barriers to U.S. exports and the actions being taken by the Government to reduce such barriers. As you know, recent developments in the international economy have not only acted to increase protectionist pressures throughout the world, but they have pointed up the detrimental effects that protectionist actions can have on all nations throughout the world.

As barriers to trade are erected and maintained, whether they are tariff or nontariff barriers, competitive opportunities are lost and market forces are disrupted. The result is that production and employment are decreased. Not only are exporting nations unable to sell the quantity of goods abroad that they would have absent trade barriers, but consumers and producers in the importing countries are affected adversely through increased prices and decreased availability of goods. In many cases, a product which is protected from foreign competition is an important input in other industries. As prices of these inputs rise or their availability is decreased due to protective measures, price increases are passed on to other industries and sectors of the economy, causing a further reduction of protection and employment levels.

As production and employment fall, business confidence is weakened. Protectionism creates economic uncertainty, exporters find foreign markets less dependable, and concentrate their attention on the domestic market. This is particularly true where the domestic market is as large as ours is. A mutually reinforcing negative effect occurs as new investment in exporting activity is discouraged.

Thus, protectionist measures can both tie resources to relatively less productive uses and restrict expansion of more productive industries. These measures can also inhibit investment crucial to the stimulation of aggregate demand and necessary structural adjustments.

These, Mr. Chairman, are only some of the economic by-products of protectionism. Import restrictions have an immediate and widespread impact in an increasingly interdependent trading world, acting as a transmission belt of recession, dividing and stagnating the world economy and inviting not only economic retaliation, but jeopardizing political, social and security relationships as well. Protectionist pressures have increased in recent years due to two factors.

First, there is the increase in oil prices and the adjustments that oil importing countries have made to cope with their large deficits. In 1974, all oil importers shared the common problem of a large oil-related deterioration in their trade positions. Since that time, however, the United States trade balance with a number of oil importing countries has been eroded further. Our growing trade imbalance has led to increased protectionist sentiment in the United States.

The second factor that has contributed to an increase in United States trade problems has been the economic recession experienced throughout the world since 1974. The United States has recovered from the recession more quickly than our trading partners. As aggregate demand has increased, our demand for imports has grown substantially. At the same time, because our trading partners have experienced slower recovery rates, our own exports have lagged. Partially as a result of these factors, we have an enormous trade deficit.

This deficit, coupled with trade problems and increased protectionist sentiment in other nations, has not only increased calls for protection in the United States, but has made the trade barriers faced by United States exporters a topic of more serious concern within the United States. It is this situation that has prompted you to invite me here today.

TRADE BARRIERS TO U.S. EXPORTS

As you are well aware, there is a wide variety of measures that can be taken which can limit the access of United States exports into a market. Both tariffs as well as a wide variety of non-tariff measures can effectively impede trade.

TARIFFS

The tariffs which United States exporters face in the markets of our major trading partners vary substantially from country to country and from product to product. In general, however, average tariff levels maintained by the major industrialized countries are relatively low. Tariffs have been the primary focus of previous trade negotiations and, as a result, have been successively decreased over the years. In addition, more tariffs have been "bound" in the GATT as a result of these negotiations, and nations have not been able to increase these duties at will. At the present time, the tariffs faced by United States exporters of industrial products are 7.5 percent ad valorem in Japan, 8.8 percent in the nine European community nations and 14.4 percent in Canada. Exports to these nations totaled \$62 billion in 1977, 52 percent of total United States exports in that year. It is notable that while these levels are not particularly high, the average tariff levels in the United States market are even lower—below 7 percent with respect to the trade of each of these countries.

Specific sectors where United States producers find foreign tariffs particularly detrimental to United States trading interests include computers, photographic equipment, construction equipment and paper products. The tariffs on trucks in the EC are particularly high, and, in many cases, textile tariffs in developing countries are prohibitive. To give one brief example, Brazil currently maintains a 206 percent tariff on denim fabric.

NONTARIFF BARRIERS

As tariffs have been reduced, other nontariff barriers and distortions to trade have become relatively more significant. There are numerous types of nontariff barriers to trade in existence today. Some are intended by governments to discriminate against foreign trade and others have come about unintentionally, often as an outgrowth of a domestic policy decision which was made without regard to the trade impact that would result.

While it would be virtually impossible to rank nontariff barriers according to the amount of trade they actually impede, it is true that they have become increasingly irritating to United States businesses over the years. Numerous NTBs have been pinpointed by our own private sector advisers for special attention in the current round of multilateral trade negotiations.

Most frequently complained of nontariff barriers include government procurement regulations, product standards, customs procedures, quantitative restrictions such as quotas and embargoes, and export subsidies.

GOVERNMENT PROCUREMENT

National procurement practices can act as significant impediments to trade. National and local governments, as well as government owned or controlled corporations, are major buyers of a wide variety of goods. However, most governments favor domestic over foreign producers in making purchases. Furthermore, governments often surround their purchasing practices in secrecy. Public notices of future purchases and background information on the purchase, bidding procedures, and awarding of contracts are often not available. As a result, foreign competitors do not have equal chances of winning a bid even in the absence of formal preferences for domestic goods.

United States sectors and industries which have had difficulties gaining access to foreign markets as a result of restrictive or non-transparent government procurement practices include power generation equipment (including nuclear reactors), communications equipment, scientific and controlling instruments, computers, chemicals, and, in the UK and France, aerospace equipment.

STANDARDS

Product standards are set by a variety of bodies within a government and cover a variety of areas. Many are primarily consumer-oriented, such as health and safety requirements and advertising standards. Others are aimed at controlling methods of production for environmental or safety reasons. Standards can impede trade in several ways. In some cases, the nature of requirements makes it virtually impossible for foreign suppliers to comply. As one example, there are standards which must be met by satisfying testing procedures during the production process, which can be burdensome. In other cases, there is disagreement internationally on what appropriate standards are. The result can be substantially more stringent standards in some countries than in others. Another cause of problems to exporters can be the diversity rather than the stringency of standards. Because there are no international guidelines for setting product standards, exporters face different testing, labeling, and certification requirements in every country. An effort to comply with a large variety of standards can be prohibitively expensive for producers. Therefore, even though they are not designed explicitly to do so, both the diversity and, in some cases, the stringency of national product standards can effectively act to impede trade.

United States industries which have had particular difficulties meeting other nations' product standards and successfully marketing their products abroad include pharmaceuticals, and scientific and controlling instruments. In addition, electrical standards for communications equipment in other nations have acted as impediments to United States exports, as, for example, have product standards maintained by Japan and Canada on wood products.

CUSTOMS

Customs regulations can reduce imports and thereby act as an effective non-tariff barrier. Administrative rules, procedures, and practices regarding entry into national markets vary widely among countries. They can be both confusing as well as excessively strict. Importers may find that they not only have difficulties meeting the informational requirements on customs forms, but that because requirements vary widely among nations they are unable to familiarize themselves with the diversity of regulations without incurring prohibitive costs.

GOVERNMENT INTERVENTION—EXPORT SUBSIDIES

Government involvement in markets can effectively impede trade through distortions of market forces. An area of particular concern to United States exporters is government subsidization. Export subsidies provide advantages to producers in competing in third markets at the expense of competitors from other nations. Furthermore, subsidization of domestic industries can lower costs and make competition from foreign suppliers more difficult.

The United States chemical, plastics, railroad equipment, and communication equipment industries have found that internal subsidies in other countries have affected their own ability to export. Subsidies in France and the United Kingdom have hindered the United States aerospace equipment industry in exporting its goods to these countries and to other markets.

ADDITIONAL NONTARIFF BARRIERS

There are a vast number of other nontariff barriers to trade which are too varied to categorize. Some are peculiar to particular nations. The Japanese system of distribution is a good example. Major trading companies in Japan purchase and sell at least half of all Japanese imports and exports. These firms have many close relationships with the wholesaling and producing companies as well. This structure can act to make entry of United States consumer goods in the Japanese market extremely difficult. These types of barriers, while not as common as other types internationally, can have substantial trade effects either individually or when aggregated.

The most traditional and easily understood of nontariff barriers, the import quota (or in some cases, embargo) still exists although it is less common today than in the period following the Second World War. More common today is the use of discretionary import licensing, particularly widespread among developing countries, which can act as either quota or embargo, but with a good deal less certainty for our exporters. Also common is state trading, where government corporations dominate or have a monopoly in a sector of trade, and imports are not always able to share in the market because commercial factors do not control the decision to buy.

Other types of non-tariff barriers to trade can result from special agreements which countries arrange among themselves. While we have little evidence at this time that there has been any extensive organization of international cartels for the purpose of inhibiting or controlling trade flows, various groups of nations have organized preferential trade agreements which act to exclude the exports of non-participating countries. These preferential arrangements provide primarily for reduction or elimination of tariffs on imports from participating countries. Imports from non-member nations are assessed the full most-favored-nation (MFN) duty rate. While the arrangements themselves can act to impede trade between adherents to preferential agreements and non-participants, additional non-tariff problems can arise from administration of the preferences.

A good example is rules of origin governing preferential trade. Rules of origin are a means of preventing exporters in non-member countries from avoiding some duty assessments by shipping a product to a preferential country with a low external tariff, and then re-exporting it duty-free to a partner with a higher external tariff. In some cases, the rules of origin which are incorporated in preferential trade agreements are unnecessarily restrictive and unjustifiably injure non-member export interests as a result. We feel that one such situation operating at the expense of United States exports exists in the EC's preferential agreements with the EFTA nations.

ACTIONS TO REDUCE BARRIERS TO U.S. EXPORTS—TOKYO ROUND OF MULTILATERAL
TRADE NEGOTIATIONS

The United States is currently involved in major efforts to reduce barriers to trade and improve world trading rules. Of these, the Tokyo round of multilateral trade negotiations is providing the broadest opportunity for expanding trade. In addition to negotiating the gradual reduction of tariffs, participants are focusing on the liberalization of individual non-tariff measures and the development of codes that would establish international rules on the use of non-tariff barriers.

Product specific non-tariff barriers are being addressed on a bilateral basis through a procedure of requests and offers. For example, the United States has sought the adoption of less restrictive rules of origin by the EC and EFTA countries through the request and offer procedure.

Codes of conduct are being negotiated in the areas of government procurement, standards, subsidies, customs valuation, licensing procedures, and safeguards. In the area of agriculture, international arrangements on trade in grants, meat, and dairy products are being developed. Furthermore, the framework group has been formed to develop ways to improve the operation of the general agreement itself. The successful negotiation of these codes will help assure that others will compete with United States industry and agriculture on the basis of the same rules.

Considerable progress has been made in the multilateral trade negotiations in the last year. Intensive negotiation of the reduction of specific tariffs and non-tariff barriers has been underway since January 1978. In January, major participants presented their initial offers to reduce specific tariffs and non-tariff measures. These offers followed a period in the fall of 1977 when a tariff reduction formula was agreed upon, requests for the liberalization of agricultural tariffs and all forms of non-tariff measures were exchanged by developed countries, and requests were made to developing countries for the liberalization of both industrial and agricultural tariffs and non-tariff barriers. We are currently involved in intensive consultations of requests and offers and are focusing on mutual improvements of the January offers with our major trading partners.

Meanwhile, work on the various codes has been progressing well. Many major issues have been resolved in the various code areas, and even in the most sensitive areas such as subsidies, serious discussion have begun with the aim of finding mutually satisfactory solutions.

Cooperation among government leaders has been excellent during recent months. Representatives of participating governments have met regularly at all levels in an effort to resolve remaining differences in all areas. We have been joined by leaders of Japan and the European community in setting mid-July as a target date for achievement of a final political settlement on the contents of a comprehensive MTN package. We remain optimistic that this target date can be met since political will to achieve a mutually satisfactory package of agreements has been consistently demonstrated by our trading partners. We do not anticipate that any areas will be left behind in this agreement and, in fact, we have made it widely known that the United States will not subscribe to an MTN agreement that does not satisfactorily deal with the most sensitive issues such as subsidies, safeguards, and agriculture.

The effect of liberalization that is achieved as a result of the MTN will be beneficial to United States production and employment in a variety of ways. However, it is as difficult to accurately estimate the results of liberalization of trade barriers as it is to determine the number of United States exports and jobs which have been lost due to foreign trade barriers. Non-tariff barriers in particular often stop trade altogether or keep it at low levels. If they were eliminated, trade flows would be quite different, and clearly would be substantially greater.

One of the reasons that estimates are rather speculative of the benefits that would accrue from reduced trade barriers is that much will depend on the efforts of our exporters to expand their sales abroad, on the continuation of technological innovation, on relative rates of increases of productivity, rates of inflation, and the other factors that determine our competitiveness abroad.

It is clear that the Tokyo round of trade negotiations will have a substantial positive overall effect on both United States trade and employment. The largest potential gains will be in areas that are subject to the more restrictive barriers. Great potential for expanded trade exists for a large number of United States industrial and agricultural products, including plastics, computers, tobacco, citrus, electrical equipment, and measuring devices.

Other benefits to United States interests, as I mentioned earlier, would result from the development of codes by improving trading rules and thereby assuring that others will compete with United States industry and agriculture on an equitable basis.

BILATERAL CONSULTATIONS

Bilateral as well as multilateral consultations play an important role in trade relations. The United States participates in regularly scheduled bilateral consultations with a number of countries and requests intermittent bilateral consultations when they are warranted by international economic conditions. An important set of consultations between the United States and Japan took place in 1977 and 1978. Discussions focused on difficulties which had arisen in our trade relationship. The discussions resulted in a commitment by Japan to liberalize its trading practices and to work towards a reduction of its large current account and trade surplus.

Japan agreed in the Joint Strauss-Ushiba statement of January 13, 1978, to enlarge its quotas on a number of products, make unilateral tariff cuts, and work to increase imports of manufactured goods. To support the American effort to promote exports to Japan, the Japanese Government sent a buyers' mission to the United States, and both Nations agreed to push the work of the Trade Facilitation Committee which was established last October to remove bureaucratic barriers to United States exports. Japan has made major progress in implementing most of the specific elements in its original statement.

PROTECTIONISM—POTENTIAL THREATS

The MTN is moving toward a conclusion during a very difficult period in the world economy. Weak economic performance has eroded support for trade liberalization throughout the world and strengthened protectionist sentiment. It has become more difficult politically for national leaders to respond to domestic economic problems and simultaneously endorse trade liberalization. In our own case, actions taken to alleviate trade problems in the footwear, television, and steel industries had to be designed very carefully in order to be responsive to domestic problems in those sectors without being perceived as excessively protectionist by our trading partners. Clearly protectionist actions on the part of the United States would undoubtedly affect the success of gatt or bilateral negotiations which are aimed at reducing trade barriers.

While all Nations are concerned about the current economic situation throughout the world, their commitment to the objective of trade liberalization is still strong. For example, while world leaders have been disturbed by the recent decline of the dollar, it has not sparked any protectionist actions abroad or jeopardized the MTN.

In order for the commitment to more liberal trade to remain strong, however, and for the current negotiations to be successful, the United States has an important leadership responsibility during this difficult period. With acceptance of this responsibility along with continued cooperation from our major trading partners, we expect a successful conclusion to current negotiations and a mutually beneficial result for all participants.

Mr. Chairman, this concludes my prepared testimony. I would be pleased to answer any questions you or other members of the subcommittee may have.

Senator STEVENSON. Thank you, Ambassador Wolff. I have the feeling that in negotiations we bargain from an unnecessarily weak position. You attributed the trade deficit to the more rapid recovery from the recession by the United States than other countries.

I think all of us are convinced beyond any doubt on this committee that there is a combination of reasons for that deficit, not all of them having to do with recovery, or dependence on foreign oil, which of course is greater in foreign countries.

They include failure to support exports, a long-term failure to rely on foreign markets, to make the effort, and as a matter of fact, an inadequate credit facility, inadequate marketing activities, and so on. That is part of it.

I also have a feeling that we just aren't as tough or as hard-nosed as we should be. If bourbon is unhealthy in France, why isn't cognac un-

healthy in the United States? What can we do in the Congress to strengthen your bargaining position, make you a more formidable negotiator?

I don't doubt for a moment that you and Ambassador Strauss are doing everything you can. But are we here in the Congress doing everything we can to make you as tough and as credible as you should be?

Mr. WOLFF. There has been an enormously increasing interest in trade in Congress certainly in the last couple of years, and particularly in the last year. There has been a great interest in our problems with Japan, for example. Japan remains largely closed to our manufactured goods. Of all of the developed countries, Japan has the lowest proportion of imports of manufactures, some 20 percent as opposed to 50 percent for other countries. After all, the United Kingdom is resource poor, and nevertheless over 50 percent of its imports are manufactured goods. There are historical and social reasons for the differences between Japan's and the United Kingdom's import patterns.

We have to make a major effort with respect to Japan. Japan's tariffs have to come down sector by sector to a level comparable to our own. They are making strides in that direction. We have begun to open up the Japanese market just a crack on citrus and beef.

Beef sells for up to \$30 a pound in Japanese markets. Now there isn't much of a market for it at that price level. The Japanese have to let in more beef. They have very restrictive quotas and we have a major market there. There has been a great deal of congressional interest. And one of the major examples of congressional cooperation has been talking to the Japanese. It happens too often that when foreign representatives meet with Members of Congress out of politeness or for whatever other reasons, the concerns of Congressmen and Senators, which are stated quite strongly to ourselves, come across a little more muted when they are made to the Japanese or others. This has not been the case in our relations with Japan in the recent past. We are making some strides. The Japanese have unilaterally reduced a number of tariffs, it is just a token but it is a beginning. They have opened up government procurement a bit and promised to do more in that regard.

They have sent a buying mission here which is a gesture of willingness to open up their market.

The amount of additional trade that might have been generated by that is speculative, but new contacts were made, and I think that is most useful.

I would not attribute the bulk of our trading problems to a more rapid expansion of the U.S. economy than of the economies abroad. That is a major factor, but trade barriers continue to be a major factor as well.

Senator STEVENSON. There are no sticks, no brooms that need to get put into the closet in order to strengthen your position?

How about Buy America? You indicated that foreign countries government procurement favor domestic producers. Should we be going further in the direction of Buy America?

Mr. WOLFF. We are moving rapidly as a country toward—

Senator STEVENSON. Is that good?

Mr. WOLFF. From the viewpoint of trade negotiating leverage, it is very good. But negotiators are not always the best judges of what is best for the U.S. economy. The Defense Department doesn't like to

see their budget eroded by having to pay a great deal more for domestic goods than for foreign goods, when foreign goods are adequate and competitive material.

So there are offsetting factors. The worse we behave in certain areas, the more leverage we have.

Senator STEVENSON. Without the opportunity to misbehave—isn't that what you really need for leverage? You don't want to misbehave, we want to stop them from misbehaving.

Mr. WOLFF. There are two schools of thought, as on most issues.

Senator STEVENSON. I am not asking for two schools of thought. I am trying to get your school of thought.

Mr. WOLFF. I would say that in each instance one would have to weigh the trade advantages versus the other disadvantages to the economy. Whether the costs outweigh the benefits. In Buy America, we would prefer to try for the next 6 months or so to open up foreign markets. We have told others that if they do not open up, the U.S. market is in the process of closing. It is quite visible now, States are adopting Buy America legislation, as well as additional laws passed by the Congress. If others refuse to open their markets, I would say that we as negotiators have no reason to oppose an expansion of Buy America domestically.

Senator STEVENSON. Was the Japanese group that you mentioned a moment ago JETRO, the group that came over to explain market opportunities in Japan?

Mr. WOLFF. JETRO was involved, but it was a group of 100 businessmen, department stores, utilities, a number of others.

Senator STEVENSON. You suggest we in the Congress don't often speak with much authority or credibility. That group came over to Washington with a long list of products that were available for sale or for which there was a market in Japan, but they only brought a few copies of the list for all of American industry. So they went to the Department of Commerce to try to get the list reproduced, and the Department of Commerce was not able to do it. And they wandered around town trying to get somebody to reproduce their list for them, so Americans could find out what all of the marketing opportunities were in Japan.

They finally wandered in here, and we finally went to the Government Printing Office and got the list of all of the marketing opportunities in Japan, all of these products, reproduced for the benefit of American industry, because the Japanese couldn't do it, and the Department of Commerce couldn't do it, apparently State Department couldn't do it.

That is the kind of performance which I suspect does not impress the Japanese with our interest in penetrating the market. It didn't impress me very much either.

Every Japanese official that has come to me on official business, or not official, has heard about beef in no uncertain terms. The Japanese tourists coming over here go back with their suitcases filled, not with American cameras, they go back with them filled with steaks; don't they?

Why can't we penetrate the beef market? I am a little afraid if the barriers came down it would be the Australians who walk in.

Why is it we can't penetrate it abroad? We talk about agricultural products, barriers to agricultural exports, which are usually in terms of feed grains. We can sell beans to the Poles and have them put them into their hogs and then buy back the hogs. Why don't we sell the hogs with our own beans, or the beef, to those Japanese who are not only faced with \$30 a pound beef, but also with a diminishing fish supply. Beef could be substituted for fish. Instead of buying our beans, why—is that political, is it cultural, and if there is something more we could do up here, what is it?

Mr. WOLFF. Every time that a barrier is in place, for whatever political or social reasons, that barrier tends to generate a vested interest. In Japan there are enormous political difficulties in moving on beef or on citrus. There were 15,000 farmers who demonstrated when we got really a very minute concession from the Japanese in January. We got the equivalent of one hamburger—although it is high quality beef, it wouldn't be a hamburger—but one hamburger per Japanese per year into Japan is the increase in the quota we got. That is a minor amount, a small beginning.

We are saying to the Japanese in the multilateral trade negotiations there has to be more let in, there has to be growth in that market.

Senator STEVENSON. Is this a global phenomena? Take my Polish case as an example. If we can sell beans for the production of hogs in Poland, why can't we sell hogs?

The same thing with respect to livestock in the EEC. Are countries around the world, many of which are trying to increase the protein content of their diets, protecting their livestock industries, building up those livestock industries, and doing so by acquiring feed grains, but not meat?

Mr. WOLFF. There is not an open market in the world with respect to meat. The United States has its own quotas. We tend to be more open than most, we let in imports equal to 7 percent of domestic consumption. The European Community has a large intervention stock in beef to support the price. They are not interested in having any more beef. If they lowered the price of beef to the consumer, they would consume more, and there would be an expanded market there. An expansion in market in either Japan or Europe would be to the benefit of Australia. That is not bad, because it would take some of the import pressure off us. We would still sell the things that we are best at, and as high quality beef.

Senator STEVENSON. Didn't our producers make a statement about supporting beef quotas?

Mr. WOLFF. If the rest of the world would open up their markets for more beef, we could afford to.

Senator STEVENSON. Would we be in a stronger position from which to negotiate barriers reductions abroad if we didn't have barriers at home?

Mr. WOLFF. We would be in a position of moral superiority, but without any political support.

No; we couldn't afford to open up our market to beef in the absence of some movement on the part of others.

Senator STEVENSON. Do you have the authority to negotiate on a bilateral basis reductions here for reductions abroad?

Mr. WOLFF. Yes.

Senator STEVENSON. That is all you need?

Mr. WOLFF. Yes; but it would be difficult to have bilateral balancing in particular products. We really need a multilateral negotiation. For example, the Spanish want to sell us sherry, our wine producers are interested in selling their sherry to other countries. We really need to have a number of countries in the room to do a deal.

Senator STEVENSON. If American livestock producers were smart, they would go to Japan and say in advertisements to the Japanese public "In order to protect one special interest, you are paying \$30 a pound for meat, your fish supplies are running out, if you open up trade, your export industries will benefit and you will only have to pay \$3."

Why don't we go directly to the Japanese public as a government or as an industry and try to educate the public? It is political, all governments respond to political pressures, why not try to change the political pressures that influence the Japanese policy with respect to beef?

Would that make sense? Do we ever do something like that?

Mr. WOLFF. There is an American livestock promotion office in Tokyo. I don't know the extent to which they advertise. It is my experience that the consumer is somehow never as powerful as producing interests in any country with respect to political pressures brought.

Senator STEVENSON. My point is should we be trying to change that. The beef promotion exercise I think is aimed primarily at the U.S. consumer. Is there any strong advertising going on in Japan aimed at educating the Japanese public to the politics, the economics, and the opportunities?

Mr. WOLFF. I think consumer pressures will build there, and the export promotion effort is growing.

Senator STEVENSON. Senator Schmitt.

Senator SCHMITT. Thank you, Mr. Chairman. I have been listening to your colloquy and I have the impression in talking with trade negotiators is very much like trying to push a friendly but very large whale off the beach. You push and push and make a dent in it, then when you stand back, even the dent disappears, and the very nice friendly whale stays on the beach.

I am sorry, Mr. Wolff, I detect this "yes; but" thing as maybe one of our problems. Every time Senator Stevenson mentioned a solution you say "Yes; but there are two schools of thought."

I realize it is a complex effort, this international trade problem, but I can't believe that you have all of the arrows in your quiver that you need, because we have been hearing in this committee and in others day-after-day of testimony from the people who would be the trading partners in our business community about things that are preventing them from realizing markets that they know exist.

Licensing procedures were mentioned again yesterday, the delay in getting a license means that a market that was there disappears.

The technological competition that they are seeing for products that we used, the kinds of products we used to produce and nobody else produced are now being produced elsewhere. New ideas and new products.

The aggressiveness of the marketing of foreign products versus our own aggressiveness. And several witnesses before this committee have

said no matter what we do in these other areas, the basic problem is that our domestic costs are too high, that in many many markets, even though we have a better product, we can't compete just because of costs. If we could remove all restrictions, we still would not be competing because of cost in manufacturing the goods.

On the agricultural side, we have seen examples in the past of where we just have missed the boat in marketing our agricultural surpluses at fair market prices.

One problem there may be, we are always looking for a dollar payment rather than for a barter payment. One question I will ask you is are we trying to barter now, or are we trying to exchange dollars? What is the situation?

Mr. WOLFF. Well, I don't believe for a moment that we are not competitive as a Nation. There are substantial foreign barriers to trade. I won't equivocate at all on our efforts to reduce those barriers. There has never been a more broad scale effort. A number of the people in this room sitting behind me are in our advisory process, they have spent 2 or 3 years now, devoting, without remuneration, an enormous amount of time detailing foreign barriers to U.S. exports, in order that we can negotiate solutions to those.

Senator SCHMITT. I am sorry to interrupt, but I think you have made that point clearly, that there are foreign barriers.

My point is there are some situations where there are no barriers except the ones we create for ourselves. The sale of nuclear plants to Brazil is a good example. They want our plants, and we decided we would not sell it to them.

Mr. WOLFF. We obviously create a number of barriers.

Senator SCHMITT. That is what this committee is hearing from our witnesses, that we have created so many barriers that even where we have these markets, they know they are available, but we can't get to them.

Now I think you ought to be doing exactly what you are doing, and that is trying to negotiate a reduction in barriers that other countries set up. But it is clear that there are many situations where we—it is not just many, it is a significant quantity of situations in terms of potential dollars—where we have created the barriers, nobody else has done it, it is our fault.

Mr. WOLFF. Absolutely valid point. That is why under Frank Weil's chairmanship the Department of Commerce has at the President's request engaged in a study that we will have the results of in the next few weeks of recommendations to the President of where we have put restrictions on our own exports that are excessive, unrelated to other policies.

You mentioned the question of agricultural goods in the past. We are disadvantaged by the practices of others. We don't have State trading in agriculture. The Government doesn't do the marketing of our agricultural produce. And often others undercut us and they undercut us through the use of subsidies. A major aspect of these negotiations is to put a curb on those practices, otherwise we will be in the business of subsidization, I have no doubt about it. We will be competing with others on the same basis, we will have to sell our agricultural products.

Senator SCHMITT. If this administration were faced with the situation that the Ford administration was faced with, where there was a

potential sale to the Soviet Union, but the leaders of organized labor said they would not ship that wheat, what would be the reaction of this administration?

Mr. WOLFF. Well, I know what the reaction has been in the last year and a half. The Soviets have come in and the administration has been not only willing, but very happy to facilitate the sale of grain to the Soviet Union.

Senator SCHMITT. But what if organized labor said they wouldn't load it, or ship it? What would this administration do? You remember what the Ford administration did.

Mr. WOLFF. Well, it is hard to speculate on any particular facts—

Senator SCHMITT. OK, you don't have to. The reason I asked the question is just to illustrate one of those things that we do to ourselves that prevents a major sale of a product which is in surplus, as a consequence of which our agricultural market was almost a disaster.

Mr. WOLFF. I can foresee no circumstances in the predictable future in which we would wish to impose or would consider imposing export restrictions on U.S. agricultural products.

Senator SCHMITT. But would you acquiesce to an export restriction imposed by somebody within our own society?

Mr. WOLFF. No; I wouldn't think so.

Senator SCHMITT. It would be interesting to see if you were put to that test.

What about your feeling about offering mixed credits from the Exim Bank? Do you think that is something we out to be doing?

Mr. WOLFF. The Export-Import Bank, should be strengthened, should be given additional resources.

When you said mixed credits—

Senator SCHMITT. A mixture of a grant and loan program.

Senator STEVENSON. Not necessarily grant money, but concessionary credits, authority to the Bank to meet whatever terms are available for a particular sale.

Mr. WOLFF. My personal opinion is that we ought to be able to match the terms of foreign governmental credit agencies if they will not adhere to the guidelines that are negotiated internationally. We do have a gentleman's agreement on export credit. Hopefully we can bring others into line, rather than engaging in competitive export subsidization.

Senator SCHMITT. You gave an example in your testimony about a 206-percent tariff by Brazil on denim fabric. Doesn't Brazil get some preferential tariff treatment from the United States?

Mr. WOLFF. Yes.

Senator SCHMITT. Do they export any textiles or related products to the United States?

Mr. WOLFF. Textiles are not subject to our generalized system of preferences. We do not give duty-free treatment to textiles, our textile tariffs are relatively high, 30 to 50 percent range.

Sentaor SCHMITT. But not 206?

Mr. WOLFF. No. Of course we have quotas. We have a textile restraint program under the multifiber arrangement. It is a rather fair and balanced program. We allow a reasonable growth in textile imports. But we have 2.5 million people in the textile industry, and rapid disruptive growth in textile imports would not be acceptable.

Senator SCHMITT. We have done nothing to try to, or at least it doesn't appear we have done anything to try to encourage Brazil to reduce that tariff.

Mr. WOLFF. I was in Brazil last week and we are getting an offer for the first time from Brazil on reduction of tariffs. We don't have it in hand yet, but they are now willing, at least to cross the line, which most developing countries have not been willing to do, and make an offer of reduction in their own tariffs.

Senator SCHMITT. Have your efforts dealt with the possibilities of environmental restrictions on U.S. exports, such as those assisted by the Eximbank?

Mr. WOLFF. No; that is not being dealt with directly in the trade negotiations; our office has not been directly involved in that area.

Senator SCHMITT. What if that became a factor?

Mr. WOLFF. When you say environmental restrictions, you mean—

Senator SCHMITT. The application of NEPA to exports.

Mr. WOLFF. I think any impediment to our exports has to be re-examined. Are you talking about Eximbank lending and the impact on the environment abroad?

Senator SCHMITT. Yes; such as Eximbank.

Mr. WOLFF. I find that rather disturbing.

Senator SCHMITT. You would find that disturbing.

Mr. WOLFF. Yes.

Senator SCHMITT. If such restrictions were applied to Eximbank activities?

Mr. WOLFF. Yes.

Senator SCHMITT. Do you have any estimates of the amount of U.S. exports and jobs that have been lost because of foreign trade barriers in the past decade?

Mr. WOLFF. No; I would say it is rather speculative.

Senator SCHMITT. Do you know of any studies that have been made that the committee might look at to make those estimates?

I realize they are tough, but sometimes somebody might have done it.

Mr. WOLFF. I will try to supply that information for the record.
[The following information was received for the record:]

ESTIMATES OF THE IMPACT OF FOREIGN TRADE BARRIERS ON U.S. EXPORTS AND JOBS

I do have indicative estimates of the impact of foreign trade barriers on U.S. exports and jobs. The estimates are indicative rather than comprehensive in the sense that they are limited to the principal tariff and non-tariff barriers maintained by our major trading partners.

In the area of tariffs, the Department of Labor has just completed a study which estimates the job and export gains which would accrue to the U.S. if our principal industrial trading partners completely eliminated tariff barriers against U.S. exports. That study, based on 1974 trade data, indicates that tariff barriers maintained by our principal trading partners cost the U.S. about 425 thousand jobs and \$7.5 billion in export sales in 1974.

These figures can and should be placed in perspective. There were 5 million people unemployed in 1974 and the 425 thousand job gains which would have been created if tariff barriers were eliminated would have reduced the number of unemployed by 12.5 percent. U.S. dutiable exports to the trading partners covered by the study were \$35 billion in 1974. Thus, the gain of \$7.5 billion in export sales which would have resulted from the elimination of foreign tariff barriers would have increased U.S. export sales to our principal trading partners by 21 percent. These magnitudes are not insignificant.

I can also provide you with some indicative estimates of the impact of foreign non-tariff barriers on U.S. exports and jobs. Like the tariff barrier analysis, the coverage is limited to our principal trading partners.

The most important non-tariff barriers facing U.S. exports are in the area of agriculture and, in particular, U.S. agricultural trade with the European Economic Community and Japan.

In the EEC, agricultural non-tariff barriers against U.S. exports take the form of variable import levies which raise import prices substantially above world prices. Their effect is to impose a high "tariff equivalent" barrier against U.S. agricultural exports. In Japan, most agricultural non-tariff barriers take the form of outright quotas on specific agricultural products of U.S. export interest. The tariff equivalence of these quotas is also extremely high.

A recent Brookings Institution study by William Cline and others suggests the quantitative impact of the EC's and Japan's agricultural non-tariff barriers against U.S. exports of agricultural products.

For the largest reduction in the EC's variable levies considered in Cline's study, U.S. agricultural exports to the EC in 1974 would have been larger by \$600 million. It would be reasonable to say that complete elimination of the EC's variable levies would have increased U.S. agricultural exports in 1974 by between \$750 million and \$1 billion. Placed in perspective, total U.S. agricultural exports to the EC in 1974 were \$5.3 billion and complete elimination of the EC's variable levy system would have resulted in a 14 to 19 percent increase in U.S. agricultural exports to the EC.

In the case of Japan, Cline estimates that complete elimination of Japan's agricultural quotas would have resulted in a U.S. export gain of \$134 million in 1974. Recent estimates by the Department of Agriculture suggests a much larger gain in U.S. exports than calculated by Cline.

To summarize agricultural non-tariff barriers, the U.S. exported \$8.7 billion of agricultural products to the EC and Japan in 1974. In the absence of the agricultural non-tariff barrier imposed by these countries, U.S. agricultural exports to these countries would, conservatively, have been \$1 billion greater than they actually were.

There are other forms of foreign non-tariff barriers for which estimates of the impact of U.S. exports and simply do not exist. We do know, however, from our industrial and agricultural advisory committees that foreign product standards, government procurement practices, customs procedures and the like do very substantially impede U.S. exports. This is why, even though no firm quantitative estimate exists, codes of behavior in these areas that will accord to the U.S. the same degree of openness in foreign markets that we provide in the U.S. market, would clearly yield major benefits for U.S. exports.

While you have explicitly asked me for indications of the costs of foreign barriers to our exports and jobs, I do not wish to leave you with the false impression that the U.S. maintains no barriers against foreign products. The Labor Department study which calculated what would have been the level of U.S. exports in 1974 in the absence of foreign tariffs also calculated what would have been the tariff free level of U.S. imports. In the absence of our tariffs, U.S. imports in 1974 would have been \$6 billion greater and the increased imports would have displaced 361,000 jobs. While the U.S. would gain more in exports and jobs from elimination of foreign tariffs than we would lose from elimination of our own tariff barriers, the net gains would be small.

The conclusions that I would draw from the tariff study is not that trade liberalization is pointless or unimportant. The purpose of trade liberalization is to increase U.S. real income. We want to be able to produce and export those products which we are relatively more efficient in producing than our trading partners and we want to be able to import those products which we are less efficient in producing. We will thus get a better price for our exports and have to pay a lower price for our imports. To achieve these objectives we must seek fair access to foreign markets and provide fair access to our market.

Senator SCHMITT. If you also happen to have some kind of even qualitative comparison between those that are lost because of foreign trade barriers versus those that are lost because of our own internal bureaucratic restrictions, that would be of help to the committee also, such as licensing delays, and other types of things.

What is your impression as a negotiator of the relative effectiveness of the Eximbank activities, compared with other activities of our trading partners, our competitors, more accurately?

Mr. WOLFF. John Moore is in a far better position to address this, of course.

Senator SCHMITT. But he has a vested interest. I think very highly of Mr. Moore. But I would like to know, since you are seeing another view of the whole thing, how do you think we are doing?

Mr. WOLFF. I think reasonably well, But I confess it is not a trade negotiator's job to assess relative effectiveness of export-import banks. So I have not studied the question.

Senator SCHMITT. What do you study? Do you study, for example, the effect of tax incentives on American exports?

Mr. WOLFF. The effect of our incentives?

Senator SCHMITT. Yes; our tax structure and how it affects our trading posture.

Mr. WOLFF. No. We study the impact of foreign taxation and foreign measures on our trade.

Senator SCHMITT. Are the Japanese and Germans having the same problems with foreign trade barriers that we are having?

Mr. WOLFF. Yes. There is no discrimination resulting in Japan being favored over United States in major third country markets. But with respect to Europe, there is a different situation. Europe has preferential trading arrangements including quite a large number of countries. So there is discrimination against us there.

Senator SCHMITT. Throughout most of the world, the United States, Japan, Germany, other trading nations are dealing with the same type of trade barriers; is that correct?

Mr. WOLFF. With the exception of Europe——

Senator SCHMITT. With the exception of Europe, if you look at the rest of the world, the rules of the game are fairly equal; is that correct?

Mr. WOLFF. Equal, equal discrimination against imports; yes.

Senator SCHMITT. OK. But the Japanese and Germans and a few other countries, the French, are expanding their export markets, not only in this country, but in other countries. Why are we not doing it as successfully?

You are trying to negotiate a reduction of tariffs which everybody else is facing too, and we are at the bottom of the list, we are not doing as well as everybody else.

So there is something we are doing, something in our particular situation that isn't working as well as the Japanese and the Germans.

I think you have got to ask yourself that question, in addition to trying to get those barriers down.

I agree. I am a free trader. But I also think that we are tending to try to blame external factors for our problems, rather than really looking at what we are doing to ourselves.

The weight of the testimony before this committee has been that it is almost entirely the things that this country is doing that prevent it from being a viable trader in this world of ours today.

For example, if we could just find some way to agree on how to encourage energy production in this country, the whole picture would start to change. We would be looked at as being stronger, in addition our dollar would be a lot better off.

I have discussed this with Ambassador Strauss before on different occasions, and I think I know his opinion. But do you feel that the Congress should reexamine the restrictions we put on domestic production of energy?

Mr. WOLFF. Well, it could have a major effect on our trade balance, if the energy legislation now under consideration is passed, that is absolutely clear.

Senator SCHMITT. Do you think the energy legislation before the Congress now is going to encourage major new production in this country?

Mr. WOLFF. Yes; I think that—I think Bob Strauss has said, and I agree with him, an enormous amount of uncertainty has been caused by a lack of a clear energy policy by the U.S. Government.

Senator SCHMITT. There is not much uncertainty, Mr. Wolff, about the effect of the energy bill on domestic production of gas and oil, not much at all.

Mr. WOLFF. I was referring to production of manufactured goods. Those who rely on energy sources face a great deal of uncertainty today.

Senator SCHMITT. One of our problems in costs is that we have allowed a cartel to develop in the world that is controlling production for the most part, and therefore is able to control prices. And the energy policies of this country are not designed to break that cartel, they are designed to acquiesce to that high price of energy.

Now we not only are affected by it, but other nations are affected. But, again, one of the arrows in our trade quiver could be an energy policy that encouraged domestic production that would break that cartel.

That is not only to our advantage, it is to the advantage of the rest of the world.

Well, Mr. Chairman, one final question. I would like Mr. Wolff's opinion on DISC. Do you think that ought to be retained as a bargaining tool?

Mr. WOLFF. The President's views are well known on that subject. There is a question of domestic tax policy whether the cost of DISC, or the benefits of DISC are worth the costs involved. My personal preference has always been that we have an international negotiation on tax practices. Whether DISC should be retained pending such negotiation is a separate question. There is no willingness abroad to negotiate on tax practices, but there are numerous income tax practices of other countries that deserve our attention.

Senator SCHMITT. Well, I hope you will supply the committee with some analysis of the effect of the trade barriers that exist abroad on U.S. exports and the jobs in this country. I am somewhat disturbed that that does not seem to have been an area of analysis by your group.

I am also disturbed, Mr. Chairman as we have talked on this committee before, about the seeming lack of any broad-based understanding of the total trade picture within the organization of at least the White House that is charged with trade negotiations.

Again, it is this lack of a strategic capacity to coordinate our trade policy within the Federal Government, not to mention the private sector, that seems to be one of the major things which the hearing are bringing to light.

I certainly hope if nothing else we will encourage that kind of strategic analysis to begin somewhere in the future.

Thank you.

Senator STEVENSON. Thank you, Senator Schmitt.

Ambassador Wolff, I have a couple more questions I would like to ask you.

I think in fairness to you it should be clear that you are a negotiator, not a policymaker, and we invited you here for the benefit from your prospective about the barriers we face abroad. It is not just barriers, though, it is also export subsidies.

I would like to know what is going to be done within the MTN on export subsidies? Are we making progress toward agreement on export subsidies and what can we expect from those negotiations?

Mr. WOLFF. We are making progress, although it has been rather difficult. The United States has been almost alone in its interest in putting some discipline into international trading rules with respect to subsidies.

We have suggested, and I believe other countries will go along with this, an elaboration of the rules on what subsidies should be prohibited, the direct export subsidies, and there are a current series of sessions in Europe this very week on that subject.

We are also making some strides on the guidelines for use of domestic subsidies.

As I pointed out a much more difficult area, it would be difficult to arrange any prohibition of something like regional aid. We have State tax holidays and city tax holidays for regional purposes as well. What we are trying to curb is the excesses, and I think we will make some progress in that area.

At least to give some guidelines and some procedures to bring international trade to respond directly through the use of offsetting measures at our border when subsidized goods arrive here.

Senator STEVENSON. Do other countries support agricultural exports with long-term credits? As you know, CCC is limited to 3 years. Are other countries similarly restrained?

Mr. WOLFF. I think the major device has been really the use of, rather than subsidized credits, it has been more in terms of subsidized sales.

I will try to elaborate on that for the record.

[The following information was received:]

With respect to credits, we have no evidence at this time that other agricultural exporting countries are offering long term credits on more favorable terms than those offered by the Commodity Credit Corporation. This assessment is based on information received from U.S. Embassies in Argentina, Australia and Canada as well as on consultations with the embassies of these countries in Washington.

With respect to export price subsidies, agricultural export prices in the EEC are an excellent case in point. For July 1978, the EEC has set a guaranteed price to EC soft wheat producers of \$202 per metric ton. At this price, EC production is greater than domestic demand. Rather than accumulate the resulting surplus, the EC exports a large portion of its surplus by means of a large subsidy paid to exporters. At the present time, for example, the subsidy for wheat shipments to Africa is \$114 per metric ton. The \$114 per ton subsidy enables EC exporters of soft wheat to sell the wheat at \$88 per metric ton in the African market. At this highly subsidized price, more efficient wheat producers are cut out of the African market.

Senator STEVENSON. That would be very helpful to us. And also to the Senate Agriculture Committee and others in considering the authority of the CCC.

Mr. WOLFF. There is always a difficulty in defining what is "aid" when dealing with developing countries and what constitutes "commercial sales."

Senator STEVENSON. Yes. Well, we are trying to separate out the non-concessionary, non-Public Law 480 CCC credit. There is a gap between Public Law 480 and CCC and one of the problems we face is the temptation of Congress to put the Eximbank into that gap. And rather than diverting its resources from the support of exports of manufactures, it seems to me and to others who consider it necessary to enlarge the authority of the CCC.

I am not sure the administration views it quite that way, but if CCC doesn't do it, I think somebody is going to end up doing it, unless there is no competition with intermediate credits. So that would be helpful to us, to get some facts on intermediate credits, and other means by which foreign countries do support their agricultural exports.

Now you indicated earlier that within a short period of time some \$50 billion of increased trade barriers have been installed. What are we doing in the MTN, what can we expect? Is there going to be a net decrease? It is estimated today the Tokyo round will result in a \$40 million increase in U.S. exports. Do you agree with that? What is the outcome going to be?

Mr. WOLFF. I think that figure relates to a tariff cutting exercise, which is, I would say, not the major part of this round of negotiations. I can't tell you yet because I don't know what entities abroad will be covered, for example, by government procurement, what gains will be achieved there.

I think that will be a long hard evolutionary process, where we will take the first step in the Tokyo round, set up some procedures for negotiations. Standards, I think, are an area in which trade will increasingly be inhibited unless we get a handle on it right away.

I have every reason to think we have a draft code that will be very effective in that regard.

Senator STEVENSON. But you don't want to hazard any predictions as to the quantified outcome of this round?

Mr. WOLFF. No; other than to say that we have an estimate this morning from one of the next witnesses who is well qualified to review the impact of proposed tariff cuts. It is much more speculative when we negotiate with respect say to nontariff barriers, such as discretionary import licensing. In effect, quotas or an embargo can appear any day of the week on any product in a developing country. If we can bring these under a greater degree of discipline, there would be a rather large amount of additional trade that would flow.

There are a number of the other areas that I have mentioned where no trade takes place now, or very little, such as in the case the Japanese beef imports. There are a number of areas of that kind. If the Europeans brought down their domestic agricultural price levels a bit, such as on feed grain, we could sell much more.

I won't say that the result of the MTN will be the difference between night and day. It will take a long time, but we are making some

progress. We are trying to change the direction that countries are moving in, in a number of areas where they are now becoming more restrictive.

Senator STEVENSON. Any more questions?

Senator SCHMITT. No; thank you, Mr. Chairman.

Senator STEVENSON. Thank you, Ambassador. I hope you will bear in mind that we would welcome suggestions in particular with respect to what we in the Congress can do to help. If there are additional authorities that would strengthen your position, give you more leverage, you would find the Congress, I think, very receptive to them. If you have such thoughts at any time, I hope you will pass them along to us.

Senator SCHMITT. Mr. Chairman, do you anticipate that the subcommittee will get a status report on the negotiations after they have progressed somewhat further, and if so, when would you expect that to occur?

Mr. WOLFF. May I say we will be bringing back the package of agreements for approval by the Congress, the nontariff barrier agreements, and we will be probably in a position in September to notify the Congress formally, as the Trade Act requires, for committees which are interested in holding hearings on the progress of the negotiations.

This is a regular procedure that is required by the Trade Act of continuing notification.

Senator STEVENSON. The jurisdictions up here are a little confused. This Trade Act includes negotiation of reduction in export subsidies. Exports are within the jurisdiction of this committee; it is the imports which are within the jurisdiction of the Finance Committee. That being the case, the emphasis has traditionally been on import policy and trade barriers, quotas, tariffs. It has historically exercised the dominant jurisdiction over the trade negotiations and typically they have reported to that committee.

But now that the negotiations have been broadened to include export subsidies, the jurisdictional picture we face has been complicated by a new interest on the part of this committee.

Mr. WOLFF. I know that Senator Ribicoff, we discussed this with him, and he plans to consult with an extensive number of committees that have jurisdiction over the areas which these negotiations cover. Government procurement wouldn't be traditionally a Finance Committee matter. Agricultural issues that are coming through will be of interest to the Agriculture Committee.

There are quite a number of areas where other committees will have a direct interest. It will be a complex job of getting these agreements considered appropriately by the Congress. But we will start that process in the fall as soon as we have something a little more in hand to discuss.

Senator STEVENSON. I will discuss this subject with Senator Ribicoff, too. I led the effort to reorganize the Senate to include the realignment of all of the committee structures with the view to simplifying them, making it more rational. In fact, we succeeded, but issues don't always behave, and sometimes committees act outside of their jurisdiction.

I just wanted to be sure you recognize this committee does have the overall jurisdiction, exclusive oversight jurisdiction, and most of the legislative jurisdiction for exports. Where we lose it is primarily with respect to the CCC, I think, which has been in the Agriculture Committee.

Thank you very much, Ambassador.

Mr. WOLFF. Thank you very much, I appreciate your support.

Senator SCHMITT. Mr. Chairman, I think that as the negotiations do affect our ability to export items to other countries, that I would certainly encourage the committee to keep as close to it as possible. Thank you, Ambassador.

Senator STEVENSON. Yes. Our next witnesses are Mr. William R. Cline, from Brookings Institution; Mr. Peter F. McCloskey, representing the electronics industry, and Mr. Nessim Levy, Level Export Sales Corp.

These witnesses will appear as a panel. We will hear from all of the witnesses, and then turn to questioning. I would ask you to summarize as much as possible; all of your statements will be entered into the record. May we proceed with you, Mr. Cline.

[The statement of Mr. Cline follows:]

TESTIMONY BY WILLIAM R. CLINE, SENIOR FELLOW, THE BROOKINGS INSTITUTION

It is a great pleasure for me to testify before this committee on the subject of U.S. exports and foreign trade policy. My comments will draw in large part upon my book on the Tokyo round of trade negotiations, recently published by the Brookings Institution.¹ Before turning to the specific questions which you have asked that I address, I would like to highlight the conclusions of that study and their implications for U.S. exports and trade policy.

ECONOMIC BENEFITS FROM THE TOKYO ROUND

The central conclusion of the study is that major economic benefits can be achieved through trade liberalization in the Tokyo round, at only minor costs in terms of either labor dislocation or disruption in trade balances and exchange rates. The economic benefits will arise from more efficient production made possible by specialization through trade, lower costs to consumers, increased economies of scale, stimulus to investment activity, and macroeconomic expansion facilitated by the anti-inflationary effect of liberalizing imports. The industrial countries stand to gain as much as approximately \$125 billion as the total, once-for-all economic benefit of cutting tariffs by the so-called "Swiss formula," which would cut tariffs by about 40 percent on average. The U.S. share of these benefits would be about \$40 billion, and those benefits could rise by as much as one-third if one were to include calculations concerning the macroeconomic gains made possible through reducing unemployment once inflation is alleviated by cheaper imports. These various benefits would not be at the expense of major job dislocations. For the United States, the gross loss of jobs to extra imports would be only approximately 90,000 jobs, or about one-tenth of 1 percent of the labor force. Even these job losses would be spread out over 5 to 10 years, as tariff cuts are phased in gradually. Moreover, there would be more jobs gained through increased exports—an estimated 120,000 jobs—than would be lost to increased imports. Finally, the economic benefits of freer trade would be about 80 times as large as the labor adjustment costs for workers affected by imports. Our study shows similar results for Japan, Canada, and the EEC. Therefore, the study concludes that the Tokyo round represents a major opportunity for economic benefits, at minimal costs, to all of the major negotiating parties.

¹ William R. Cline, Noboru Kawanabe, T.O.M. Kronsjo, and Thomas Williams, "Trade Negotiations in the Tokyo Round: A Quantitative Assessment" (Washington, D.C.: The Brookings Institution).

EXPORT OPPORTUNITIES

Turning more specifically to exports, the subject of these hearings, U.S. exports do stand to gain considerably from liberalization of external barriers. Our estimates indicate that cutting tariffs by the Swiss formula would raise U.S. exports by about \$3 billion. These export increases would be concentrated in the following broad sectors: chemicals, transportation equipment, paper and paper products, and agricultural products (tables 1 and 2). The only sectors where relatively large import increases would occur are plastics and rubber, basic metals, and miscellaneous manufacturers. Textile imports would rise by large amounts if textile quotas and tariffs were liberalized. We do not expect that to happen, even though it would be a major boon to the American consumer and could be accomplished with only minor job losses (less than 2 percent of the textile labor force).

In the aggregate, U.S. exports should rise by more than imports as the result of tariff liberalization. Tariffs are high in Canada, a major U.S. customer, and liberalization would enable the United States to become more competitive within the free trade area of the EEC and EFTA. But the negotiations are basically well balanced: Although the United States and Japan would have moderate trade balance increases and Europe and Canada moderate reductions, no area would experience truly large trade balance changes (relative to exports), as the result of the Tokyo round.

AGRICULTURAL NONTARIFF BARRIERS

We have also examined agricultural nontariff barriers. In this area, foreign protection is much more severe than U.S. protection. Agricultural quotas in Japan and variable levies in Europe limit our exports, while U.S. agriculture nontariff barriers are relatively minor and are limited to specific sectors such as dairy products and meat. If the tariff equivalent of agricultural nontariff barriers were cut by the Swiss formula, U.S. agricultural exports would rise by approximately \$500 million per year. This estimate implies a significant export opportunity for the United States. At the same time, the estimates do suggest that agricultural nontariff barriers are relatively less important to U.S. exports than some studies in the past have implied; and in particular, our results suggest that it would be a serious mistake to forfeit the trade expansion possible through general liberalization by repudiating the Tokyo round in the event that it does not achieve a breakthrough in the area of agricultural nontariff barriers.

GOVERNMENT PROCUREMENT

In the case of government procurement, we have used input-output tables to compare the import propensities of government against private sector import propensities for the same product sectors. This method provides an estimate of the degree of discrimination against imports in government procurement. Estimates for European countries and the United States show that France, the United Kingdom, and the United States all show a considerable degree of discrimination against imports in government procurement. Germany and some other European countries do not show comparable discrimination. A 60 percent cut in margins of government discrimination might raise U.S. imports by approximately \$600 million annually, and imports into the EEC might rise by a similar amount. Japan similarly discriminates against imports *de facto*, although quantitative estimates are not available for Japan.

OTHER NONTARIFF BARRIERS

Quantative estimates are not available for the restrictive effects of other nontariff barriers. Some of the recent trends in nontariff restrictions, both abroad and in the United States, are disturbing. At home, we have imposed voluntary quotas on shoes and color television sets, as well as the trigger pricing system for steel. Nevertheless, nontariff barriers are perhaps still not as severe in the United States as they were in the early 1970's, when we had quotas on steel, sugar, and petroleum, before we liberalized these and other sectors in the fight against rampant inflation in 1973 and 1974.

In Europe, there is an ominous tendency toward forming cartels to organize trade in sensitive sectors, especially steel, shipbuilding, electronics, and, as always, textiles. The single largest challenge in the trade field today is probably to stem the tide of protectionist measures such as these. And we cannot hope to keep foreign markets open for our exports if we increasingly hem in our own import market. That is why it is exceedingly important to reject new efforts in

the United States to restrict imports by quotas and by the abolition of important elements in the U.S. import network such as tariff preferences and provisions for offshore assembly.

Over the whole range of nontariff barriers, a ranking by their severity in restricting U.S. exports would probably be as follows: First, agricultural nontariff barriers, second, the emerging network of restrictions going under the name of "organized trade," third, government procurement restrictions. I do not believe that border tax adjustments are an important nontariff barrier; if countries stopped rebating indirect taxes on exports, they would eventually appreciate their currencies as the result, with little net change except for selected products. But there is a real danger of massive disruption to trade in this area if the Supreme Court decides that rebates of indirect taxes constitute a subsidy subject to countervailing. As for product standards, restrictions in this area appear to be rising, but there is some hope that a code to be agreed upon in the Tokyo round will reduce these restrictions.

As for the ranking of our own nontariff barriers that we impose on the rest of the world, the ranking would probably be as follows: First, textile quotas, which mainly thwart the export prospects of developing countries; second, ad hoc safeguard actions (such as those in the cases of shoes and television sets); and third, countervailing duties as well as dumping. We do not follow the international practice of requiring injury before applying countervailing duties (and we are on a collision course especially with some important developing countries as a result). In antidumping, the Trade Act of 1974 paved the way for another aberration from internationally accepted rules: Judging dumping on the basis of "constructed cost" rather than selling price, a measure that gave birth to the trigger pricing system for steel.

FINAL COMMENTS

I believe that most of your areas of inquiry have been addressed in my comments to this point. Let me close by reemphasizing certain points and raising one additional point. By reiteration, first, significant gains in exports and export jobs can be achieved through a successful conclusion to the Tokyo round of trade negotiations. As I mentioned, 120,000 export jobs could be expected from the proposed tariff cuts alone, and still more export jobs would arise if agricultural nontariff barriers were liberalized as well.

Second, and for the Tokyo round itself I would reemphasize that the potential economic benefits for all are large and the costs small. My impression is that the prospects are relatively good for the conclusion of agreements cutting tariffs, and for certain NTB codes of conduct, but that prospects are dim for liberalizing agricultural nontariff barriers. Nevertheless, even a moderate success in the Tokyo round will represent a major accomplishment in view of the strong forces of protectionism, which have been stirred up primarily as the result of slack employment conditions here and abroad. In this connection, I do not see the decline of the dollar as a major source of protectionism abroad, because Germany remains oriented toward free trade and Japan has been making special efforts at liberalization, and it is primarily with respect to the Deutschmark and yen that the dollar has declined. Protectionism seems more rampant in countries such as France and the United Kingdom, where the level of economic activity is the problem rather than the exchange rate.

Finally, I would make one point not addressed earlier. Among the countries protecting their markets against U.S. exports, Japan has frequently been singled out as a major offender. I would suggest that the United States may have overstressed official Japanese protection as a source of Japan's trade surplus. The average level of tariffs on dutiable items is 11 percent in Japan, not much higher than our own and that of the EEC (both 9 percent) and lower than the tariff average for Canada (14 percent). Japan's agricultural nontariff barriers are less significant than those in Europe. In industrial products, the cultural features of the distribution system (rather than outright quotas) may tend to hinder imports, and domestic purchasing practices of some industry groups may work against imports, especially in periods when domestic sectors are depressed. The new U.S.-Japan Trade Facilitation Committee should be the logical vehicle for addressing these more informal problems. In short, I suspect that we have passed the point of diminishing returns in the exercise of criticizing Japan for its import regime—which is not to say that our negotiators should fail to give priority to its liberalization. In any event, Japan's trade surplus should respond primarily to the level of domestic activity, and (after a lag), the exchange rate.

These comments complete my presentation. The attached tables provide additional details on export increases to be expected from tariff liberalization, by product sectors and markets; and further details may be found in the Brookings study on the Tokyo round.

TABLE 1.—INCREASED U.S. EXPORTS RESULTING FROM EXPECTED TARIFF CUTS,¹ IN THE TOKYO ROUND, BY MAJOR PRODUCT SECTOR AND MARKET AREA

(1974 base; in millions of dollars)

BTN sections	Direct exports				Induced exports to LDC's, Socialist countries	Total exports
	Total	Canada	Japan	EEC		
1. Animals, products.....	15.2	1.7	7.4	5.9	5.0	20.2
2. Vegetable products.....	79.8	7.6	58.5	9.9	26.1	105.9
3. Fats, oils.....	14.8	5.5	7	6.7	9.4	24.2
4. Food, beverages, tobacco.....	95.7	9.0	3.0	66.2	31.3	127.0
5. Mineral products.....	38.8	1.8	21.6	14.1	19.3	58.1
6. Chemicals.....	397.8	71.1	45.1	253.3	21.2	419.0
7. Plastics, rubber.....	298.7	80.3	25.4	166.5	16.0	314.7
8. Hides, leather goods.....	8.4	5.3	5	1.8	3.0	11.4
9. Wood, cork articles.....	15.1	7.6	6	4.5	5.4	20.5
10. Paper, products.....	164.9	73.6	15.0	63.0	65.6	170.5
11. Textiles.....	(229.7)	(124.7)	(4.9)	(78.9)	5.3	(234.0)
12. Footwear, headgear.....	7.6	3.3	2.5	9	0	7.6
13. Stone, ceramics, glass.....	44.2	19.9	1.8	17.1	3.4	46.6
14. Jewelry.....	4.5	2.3	9	9	2	4.7
15. Base metals.....	245.4	122.2	27.8	75.7	23.7	269.1
16. Machinery, electrical equipment.....	828.7	279.5	129.4	320.2	84.8	913.5
17. Transportation equipment.....	218.1	74.1	62.2	58.7	39.0	257.1
18. Precision instruments.....	189.0	33.0	2.2	137.7	5.3	194.3
19. Arms.....	3.4	1.9	4	9	0	3.4
20. Miscellaneous manufacturers.....	62.0	25.4	19.2	12.2	0	62.0
21. Art.....	0	0	0	0	0	0
Total (excluding textiles).....	2,732.0	825.0	424.2	1,216.2	303.0	3,035.0

¹The probable tariff cutting formula, the "Swiss Formula," calls for tariff cuts averaging approximately 40 percent, with graduated cuts that rise with the height of the tariff. The estimates here refer to a tariff cutting formula almost identical to the Swiss formula. See William R. Cline, Noboru, T. O. M. Kronsjo, and Thomas Williams, "Trade Negotiations in the Tokyo Round" (Washington, D.C.: Brookings Institution, 1978).

Source: Unpublished estimates, Brookings Institution project on trade liberalization.

TABLE 2.—INCREASED IMPORTS, AND TRADE BALANCE CHANGE, RESULTING FROM EXPECTED TARIFF CUTS IN THE TOKYO ROUND, BY MAJOR PRODUCT SECTORS

(1974 base, in millions of dollars)

BTN sections	Increased imports	Trade balance change
1. Animals, products.....	15.1	5.1
2. Vegetable products.....	26.7	79.2
3. Fats, oils.....	5.1	19.1
4. Food, beverages, tobacco.....	164.0	-37.0
5. Mineral products.....	2.4	55.7
6. Chemicals.....	84.7	334.3
7. Plastics, rubber.....	764.3	-449.6
8. Hides, leather goods.....	73.8	-62.4
9. Wood, cork articles.....	32.5	-12.0
10. Paper, products.....	5.7	164.8
11. Textiles.....	(1,778.8)	(-1,544.8)
12. Footwear, headgear.....	82.1	74.5
13. Stone, ceramics, glass.....	50.7	-4.1
14. Jewelry.....	47.3	42.6
15. Base metals.....	369.4	-100.3
16. Machinery, electrical equipment.....	156.8	756.7
17. Transportation equipment.....	141.0	116.1
18. Precision instruments.....	130.1	64.2
19. Arms.....	10.4	-7.0
20. Miscellaneous manufactures.....	229.3	-167.3
21. Art.....	0	0
Total (excluding textiles).....	2,391.4	643.6

Source: See table 1.

Senator STEVENSON. Thank you, Mr. Cline. That was very helpful and interesting.

Mr. McCloskey.

STATEMENT OF PETER F. McCLOSKEY, PRESIDENT, ELECTRONIC INDUSTRIES ASSOCIATION, WASHINGTON, D.C., ACCOMPANIED BY PETER R. LEVIN, GENERAL ELECTRIC CO., AND JONATHAN H. LASLEY, CONSULTANT, WASHINGTON, D.C.

Mr. McCLOSKEY. As we have been in previous appearances during this series of hearings on U.S. export policy and this country's export trade, the Electronic Industries Association (EIA) is again most pleased for this opportunity to bring its views and concerns before this subcommittee. I am Peter F. McCloskey, president of the EIA. Accompanying me are two chairmen of Industry Sector Advisory Committee (ISAC's) to the President's Special Trade Representative for the current Geneva trade negotiations. On my left is Mr. Peter R. Levin of the General Electric Co., chairman of ISAC No. 19 which is concerned with consumer electronics and household appliances. Mr. Levin is also chairman of EIA's International Business Council. To my right is Mr. Jonathan H. Lasley, chairman of ISAC No. 22 which concerns telecommunications equipment and nonconsumer electronics. Mr. Lasley has had long experience in the worldwide marketing of electronic systems with Rockwell International and, having retired from that position, now operates his own consultancy in Washington, D.C.

Mr. Chairman, because descriptions of EIA's membership and product scope appear in the record of previous hearings of this subcommittee, let me simply reference them here. Similarly, our industry statistics.

In order to set a perspective on our appearance here today, however, I should like to cite two aspects about the exports of America's electronic industries.

First, 25 percent—one-fourth—of our total electronics production is exported. This accounts for almost one-tenth of U.S. manufactured exports. Indeed, these figures understate both the export contribution and export dependency of these industries: for they do not include the substantial electronic content in commercial aircraft, military equipment and industrial machinery which are also exported.

Second, not only do exports account for a significant portion of electronic capital goods, in both sizable quantities and value, our industries offshore sales include electronic components of all types—solid state devices, resistance and capacitance devices, power tubes—as well as functional assemblies and subassemblies, and finished products such as calculators and, interestingly, some television sets.

In both their diversity and sales volume, these exports demonstrate—we believe—that in the main our electronic industries are internationally competitive. Other of our statistics on file with this committee demonstrate something equally important: Namely, much of the U.S. electronics industry growth has been directly attributable to rising exports which, simultaneously, have demanded a consistently increasing share of our production. It has been these offshore markets which have, in general, enabled our companies to achieve and maintain

an economic scale of production—and, thereby, economic competitiveness. Obviously, without these exports, the employment in our industries would most certainly be much lower by several hundred thousand jobs and industry profitability would be much reduced. Moreover, the deficit in the U.S. balance of trade would be far worse; so, in all probability, would be the Federal deficit—and, thus our national inflation.

EIA does not make those statements in self-praise of its organization or its industries. Rather, we do so in order to bring focus upon the subject of this hearing—the barriers imposed by other countries against U.S. exports. The very success of U.S. electronic products in world markets has, we believe, given our companies a strong comprehension of the barriers thrown up against their entry into international trade. And it is out of these company perceptions that our testimony is drawn.

Let me, then, state the obvious: the extent and design of those foreign barriers is protective of local industry—to compensate for its relative inefficiency, to mitigate or afford relief from the rigors of competition in the form of imports which might offer lower price, better quality or attractive innovation * * * and perhaps all three customer advantages. In effect, some of those barriers are directed against U.S. goods—but very few are so blatantly identifiable. Many, however, are applied with a more even-handed sense of discrimination against all—but that is discrimination none the less.

Before discussing specific barriers which restrict or totally exclude our exports, EIA believes it essential to raise a further point: As respects many of our larger potential foreign markets, the elimination or reduction of a single barrier will not necessarily gain admission for U.S.-produced electronic goods. On the contrary, where barriers against particular products occur and the serious intent is exclusion, the defense is in depth: a series of adroitly conceived and carefully administered obstacles designed to both discourage and, if need be, effectively deter the would-be foreign marketer.

For American electronics manufacturers, one of the most difficult barriers is the widespread practice of restrictive governmental procurement—the requirement or compulsion to “buy national” if at all possible, regardless of price and often regardless of quality. To be sure, there is nothing new in such purchasing policies; virtually all countries practice them—with appropriate national nuances, of course. And some of this is, we believe, justified when the governmental concern is for national defense.

But there are, in EIA's opinion, less justifiable instances—and these are proliferating. For example, the well-known expansion of telecommunications and transportation systems—mainly directed toward commercial and personal purposes, but carried out under government ownership and oversight. A parallel development is the increasing restrictiveness placed upon the purchasing activities of manufacturing, banking, and service businesses as these fall increasingly under government dominance. EIA knows of no reliable estimates of the market value for products and services that are covered by the protective umbrella of restrictive procurement practices. But, for electronics alone, our informed guesses place the number at not less than \$20 billion annually—and growing. A portion of that growth, too, reflects the speed with which the developing countries—and especially the more

advanced developing nations—are emulating the entrenched purchasing policies of the developed countries.

I have alluded to national government control of telecommunications systems. In the countries which should be our major trading partners, whether European or Japanese, the telephone and telegraph systems—as, indeed, the other public utilities—are, where not government-owned, certainly government dominated. This statement is made advisedly, since some foreign telecommunications systems occasionally profess to be privately owned. Suffice it to say that, to our knowledge, only one American electronic company has sold U.S.-made communications equipment to even one European PTT and none to the Japanese PTT; nor, with that single exception, have American electronic companies even received requests-for-quotation from them.

Stated baldly, in developed and developing nations alike, the general rule is: If the product is produced locally, don't import it. If you must import it, then minimize the offshore portion of the order by maximizing what can be forced upon the seller in the form of locally produced parts and locally domiciled services. In sales of U.S. commercial aircraft to Europe, for instance, we see increasing emphasis placed upon the incorporation into the deal of European-produced electronic systems—avionics, as the generic term has it—which provide communications and monitor and/or control all functions of the plane and its engines, whether airborne or on the ground. You can appreciate the magnitude of this barrier when you consider that avionics today comprise between 15 and 20 percent of a commercial jet airplane, depending upon its configuration and mission.

Closely related to these local content provisions are governmental requirements for offset purchases of different and unrelated goods by the foreign seller. The condition of sale is that the seller commit to balancing some or all of his value against the sale of exports from his customer country. No offset, no sale. In the past, this has been a standard form of barter for the East Bloc countries which—on one level of understandability—wanted or needed it because of convertible currency shortages. It has now been embraced by the LDCs, sometimes ostensibly for balance of payments reasons, but also—it may be suspected—as a means of exporting unemployment. Now we find fully developed nations testing the technique; among them Switzerland.

Of a different nature is the discrimination against our products in consequence of the formulation of national and regional technical standards and requirements for product certification. As a major standards organization of this country, EIA does not, of course, object to the concepts of standardization and certification. When fairly and properly developed and implemented, they confer substantial benefits, not only on their industry practitioners but especially upon users or consumers of standardized and certified goods. But our experience in selling to other countries has been one of facing growing restrictions or attempting to beat them back. The problem is extremely complex. The European Economic Community has been regularly adopting directives on mandatory standardization and certification which, in their content and administration, look inward to enhancing intra-Community trade while increasing the relative disadvantage of external suppliers such as the United States.

Concomitantly, the EEC and EFTA countries have been putting into place voluntary standards systems in electronic products that, when adopted in their separate countries, become virtually or in fact mandatory. Thus, today, a U.S. manufacturer of electronic components can no longer, in some of Europe, supply parts to a producer of, say telephone switching equipment. The U.S. exporter cannot do so, very simply, because he cannot receive technical certification of his product unless that product is actually manufactured in Europe. And that is not the fiat of the European equipment manufacturer; it is the dictation of his customer—a national government which operates the country's telecommunications system—that no equipment will be acceptable without the European certification mark. And, as matters stand today, no U.S. product will ever receive such an "acceptable" because our companies are debarred from membership in such European standards organizations as govern electronics and our views on an emergent regional standard are neither solicited nor taken into account.

It is this type of practice which, almost a decade ago, led the U.S. Government to protest such discriminatory actions and to initiate in the GATT the development of an international code of conduct on technical barriers. In a moment, I will comment on this and other aspects of the current multilateral trade negotiations in Geneva.

But first, a brief noting of other barriers to our exports. And here, Mr. Chairman, I regret that your committee's request that we appear today reached us less than a week ago. Had we had more time, we would have been able to prepare a more extensive written statement which addressed topics of high interest to both this committee and the EIA. So I ask that the brief mention, here—in oral testimony—of mere topical references should not be construed as diminished or secondary concern on our part.

For one example, let me cite tariff barriers. There are numerous discrepancies of duty rate among the developed countries. But so long as these differences merely compensate for comparative levels of efficiency and serve as a brake against market disruption, we do not object to their presence or rate levels. What we do object to is the failure or inability of the GATT system to find a method for stabilizing and binding the duty rates of the LDC's and a few developed countries at levels that eventually afford compensation, and only that.

Border tax adjustment—especially in the instance of multiple-stage taxes—is clearly a major barrier to our exports. The impact is precisely that of a protective tariff; and, as EIA pointed out in its testimony here of March 9, this is the most pervasive and strongest of trade barriers erected against our products. Of course, the issue is immensely complex—so complex, indeed, that much argument has tended to clothe this inherently discriminatory problem in emotional rhetoric and what, charitably, one must characterize as accordingly simplistic analysis. It is more than regrettable that, to all appearances, the issue will not be brought to the table in the present round of negotiations. For, absent even a will to seek solutions or mitigation, the legitimate export potential for our high-technology industries—such as electronics—will remain permanently impaired.

What, then, of the state of the Geneva negotiations and our expectations on meaningful barrier reduction? On the matters I have today discussed—or, more properly, barely scratched—and others such as import licensing, customs valuation, credit restraints selectively imposed

on importers in other countries, we of the EIA wish it was possible to be optimistic. As exporters—efficient exporters—we desperately need effective, enforceable codes of conduct and evenhanded rules which reduce barriers. Given success in these areas, across the spectrum of our industries, every additional \$1 billion in exports means an added 35,000 direct jobs in our exporting companies and perhaps another 20,000 to 25,000 jobs in their supplier industries.

But we have a gnawing fear that the negotiators and their governments are preparing to settle for only cosmetic agreements—the appearance rather than the reality that barriers will be reduced—that discriminatory conduct will be brought under better control. That fear is born of the current search for minimal packages and efforts at ranking or assigning priorities to particular barriers. Yet, as we have pointed out, the protective defenses against exports exist in depth. Those which will be abandoned most readily are the least important.

What we need is a different perception: Export occurs only with the movement of a specific product in a specific transaction. And no transaction can occur in that product until the entire minefield that inhibits its movement has been cleared of detonating explosives, barbed wire, and bunkers. If restrictive practices in government procurement are relaxed, there still remain the obstacles of technical standards, offsets, border tax adjustment, and the like. We need, in short, to clear paths of entry—and, unless this is accomplished at Geneva, the exercise will have been essentially meaningless.

My colleagues and I will be pleased to answer any questions. Thank you.

Senator STEVENSON. Thank you, Mr. McCloskey. Mr. Levy.

STATEMENT OF NESSIM LEVY, VICE PRESIDENT, LEVEL EXPORT SALES CORP., NEW YORK

Mr. LEVY. Good morning, Mr. Chairman and members of the subcommittee, my name is Nessim Levy. I am a vice president of Level Export Sales Corp., a division of Level Export Corp., of New York City. I appreciate this opportunity to discuss with you some of the barriers to trade that we have encountered, and their impact on our ability to compete successfully abroad.

Level Export has been engaged in exporting American-made textiles for over 32 years, and is now the Nation's largest exporter of denim and corduroy fabric. We are the main export distributor for Cone Mills, the largest American manufacturer of denim and corduroy cloth. Last year, our volume of textile exports was about \$117 million, most of which went to customers in Western Europe who manufacture jeans or resell to jeans manufacturers.

Mr. Chairman, the international textile trade furnishes a textbook example of how governments are able to erect barriers to competition from American exports.

Tariff restrictions are the most direct and obvious barrier to the free flow of textiles in international commerce. It is not infrequent for countries experiencing fiscal difficulties to use a system of surcharges on their tariff rates—sometimes in conjunction with a quota—to restrict imports even further. For example, in the spring of 1977, Spain subjected American textiles to a surcharge of 20 percent of the

normal duty rate, so that cotton piece goods normally dutied at 35 percent were suddenly burdened with a 42 percent rate. While this surcharge applied to all countries' merchandise, our competitors in the European Economic Community ("EEC") had the advantage of a lower base rate because of the mutual tariff reductions between Spain and the Community. The Spanish surcharge was bad enough, but its adverse impact on U.S. exports was worsened by a quota on cotton textile imports. The quota system required that imports be licensed—a requirement that was enforced in such a way as to restrict access to the Spanish market still more. Long delays in obtaining the supposedly automatic licenses were common.

Tariff barriers to the textile trade in Western Europe—seemingly a straight-forward subject—become quite complex because of the tariff relations between Europe's two major trading blocs—the EEC and the European Free Trade Area ("EFTA"). In 1972 and 1973, the EEC negotiated a series of agreements with the EFTA countries—Switzerland, Austria, Scandinavia, and Portugal—reducing duties on many goods—including textiles—to zero by last July. These tariff reduction agreements set down so-called rules of origin to tell whether goods originate in the EEC or an EFTA country for purposes of duty-free treatment. The most stringent and exclusory of these rules of origin apply to textiles. To give you an example: Under the rules, if U.S.-origin denim is used to make blue jeans in Italy, those finished jeans cannot qualify for duty-free export to Switzerland. Jeans made of EEC-origin denim, however, do qualify—giving the Italian manufacturer a Government-sponsored incentive to discriminate against American products in buying cloth.

These rules of origin have been a significant source of injury to the American textile industry. Level Export has lost orders from major customers in France, Italy, and the United Kingdom—all EEC countries—because these customers would lose the benefit of duty-free importation into Switzerland and Scandinavia if they used American denim to manufacture their blue jeans. These customers have told us they were forced to switch to Italian piece goods which—although lower in quality and market acceptance than American denim—assured them the 16 to 30 percent advantage of duty-free importation into EFTA. This is the sort of discriminatory governmental action that American exporters cannot overcome through normal quality and price competition.

I should note that the EEC-EFTA tariff reduction agreements have been attacked by a number of governments, including our own, as discriminatory and inconsistent with GATT most-favored-nation requirements. To date, these protests have not brought relief.

The rules of origin problem we have encountered is something of a hybrid between tariff and nontariff barriers to effective competition by U.S. exporters. I wish to turn now to purer forms of nontariff trade barriers. Because of its chronic fiscal problems, Italy has emerged as Western Europe's master craftsman of such obstacles. During this discussion, Mr. Chairman, I think the subcommittee should bear in mind that U.S. goods and exporters are affected to a much greater extent by most trade barriers in Europe than are our European competitors, who benefit within the EEC from the "free flow of goods" requirements of the Treaty of Rome, and from the preferential EEC-EFTA tariff reduction agreements I have mentioned.

Economic penalties on purchases of American goods are one major class of nontariff barriers to U.S. export sales. For example, in the spring of 1974, the Italian Government began to require that, before imports could be released from customs, the Italian importer had to deposit 50 percent of the imports' value with the government for 6 months, interest-free. This decree, which was in place for 9 months, really threw cold water on the import trade. Italy then came up with laws that limited, and placed surtaxes on, Italians' remittances abroad, which had a further negative impact on the willingness of our Italian customers to purchase from us.

A second category of nontariff barriers to American exports covers bureaucratic snarls in the importation process. I have mentioned Spain's erratic administration of the import licensing requirement imposed last spring. Italy now has gone Spain one or two better: On October 25, 1977, the Ministry of Foreign Trade issued an import licensing decree covering all cotton textiles—such as denim and corduroy—imported from a non-EEC country. Under the decree, the importer must now—

Prepare a newly devised import authorization form in nine copies; and

Complete a technical certificate on the imported textile's fiber and dye content, weight, and so forth, in triplicate—converting all imperial units to metric equivalents.

This mountain of papers is first forwarded to the Office of the Director General of Imports and Exports in Rome. If found to be in order, the papers next go to the Ministry of Finance for approval. Only after such approval is received are the forms sent to the customs officials at the port of entry. During the delays occasioned by this bureaucratic minuet, the importer's costs mount—and, in some cases, we must extend additional credit terms to customers on merchandise tied up for long periods at the Italian docks awaiting an import license. Some customers now pay us with letters of credit which do not become operative until an import license is granted. All of this means higher costs of doing business for the U.S. exporters.

The Italian Government next invented an even more insidious restriction: Imports were to be appraised, not by the Government, but by the domestic industry, the Italian Associazione Tessile. In other words, our competitors were to decide how much our goods were worth—and, thus, how high the applicable duty would be. Not surprisingly, the appraised values far exceeded invoice prices, despite the fact that these prices were negotiated at arm's length between Level Export and its Italian customers. According to the Italian industry, our goods are worth 30 to 50 percent, in some cases even 80 percent, more than our Italian customers are willing to pay. As a result, these customers must pay the duty on this inflated appraisal or their goods stay at the dock. We now are asked to have the Italian consulate in New York "certify" our invoices to speed the clearance of our goods in Italy. For this ridiculous, nonfunctional step, we are charged about \$25 per invoice. According to counsel in Italy, no speedy administrative or judicial relief exists to remedy such governmentally sanctioned extortion. This system is discriminatory, as well as arbitrary. The December 27 decree, which imposed this appraisal requirement, exempts all EEC and EFTA countries. So, American

exporters and our customers wind up at a severe competitive disadvantage vis-a-vis our European competitors.

For a mercifully brief period in January and February of this year, the Italian Government further restricted trade by specifying eight Italian customs clearance points at which all textile and steel imports would have to be entered. Naturally, additional freight costs and delays were entailed in moving goods from the ocean port of entry first to the proper clearance point and then back to the customer's place of business. By mid-February, howls of protest from the ports excluded from this lucrative customs business had forced the number of open ports for textiles back up to 41. The protectionist intent of this brief experiment—and the lengths to which governments are prepared to go in the area of nontariff restrictions—are, I think, most instructive for this subcommittee.

Even as seemingly neutral a matter as the units of measure used in marking exports to Europe can present a real trade barrier to American business. Under two directives of the EEC Council of Ministers, use of the metric system became mandatory in all commercial transactions in the countries of the Common Market 3 weeks ago, on April 21, 1978—with the temporary exception of Ireland and the United Kingdom. The individual EEC countries are responsible for implementing the metric directives through national legislation. Long before the effective date of the directives, we worked very hard to assemble the various EEC member states' new requirements. We hoped to be able to adjust our labeling and invoicing procedures to comply in good faith with all applicable regulations. The EEC offices in Washington and Brussels had no information to offer, and, despite good faith efforts, our Department of Commerce was not able to keep abreast of events, nor to advise American businesses on the requirements specifically applicable to particular product lines. Indeed, much of what the EEC and Commerce officials know about metric requirements for textiles, they learned from us.

Nonetheless, despite our repeated inquiries in all countries of the EEC and their U.S. embassies, we got cooperation from only a handful of foreign governments in our compliance attempts. Finally, we had to go ahead—on the basis of incomplete information—and make a business judgment. We now mark all our goods and make out customs forms in both metric and imperial units. We thought this would comply with the laws of the countries that responded to our inquiries, and could only hope that dual-marking met other countries' requirements.

Once again, Italy foiled us. On April 22, 1 day after the EEC directives' effective date, Italy's Official Gazette published implementing legislation requiring that markings and customs documents contain only metric units. At least, we think that is what the law means. We have asked for an official opinion on whether our present system of dual-marking passes muster. Mr. Chairman, a one-third of our annual sales are to Italian customers. If we have to have a totally separate marking and invoicing system for Italy alone, somehow we will create one and live with the higher costs. But we must also live with the question of how long we can hope to continue doing business with the Italian Government constantly stacking the cards against us, and how long it will be before some new and ingenious barrier to American exports knocks us out of Italy entirely.

The examples I have given you this morning, mostly involving Italy, are not confined to that country or to the textile trade. Governmental protection of politically sensitive industries—textiles, steel, agriculture, et cetera—have affected American exports and our ability to compete in the protected markets for years. But the forces of protection seem to be growing, and stifling restrictions on international trade to benefit narrow economic sectors have become increasingly acceptable throughout the world.

Tariff surcharges, currency restrictions, import licensing and quotas can, and have been, applied to many American exports by foreign governments. The discriminatory use of rules of origin, such as those in the EEC-EFTA agreements, reduce American ability to compete in supplying raw materials to industries throughout Western Europe. Worst of all, however, are barriers set up through governmentally sanctioned ignorance of importing requirements and procedures. Through such forced ignorance—as in the case of metric marketing requirements—American goods can arbitrarily be excluded from markets, and the exporter is left powerless to determine what went wrong and how it can be remedied.

I hope that this sharing of our long experience with foreign restrictions on trade in American-made textiles is of assistance to the subcommittee's inquiry, and I thank you for the opportunity to bring these matters to your attention. If you have questions, Mr. Chairman, I would be happy to try to provide further information.

Senator STEVENSON. Thank you. That mess you have described in Italy sounds as much owing to bureaucratic incompetence as to any calculated effort to exclude U.S. imports. Is that a unique situation? Is it typical? Do exporters encounter such a mixture of protectionism and incompetence throughout the world?

Mr. LEVY. In Western Europe it is not especially rare. I would like to say in our estimation the incompetence in the bureaucracy is an intentional measure, these papers are misrouted or rejected for trivial reasons, and it is an element of nontariff restriction against American trade. We had the same problem in France 2 years ago, but after some protest through the Department of State, those measures were improved. But it took 6 months to get the French situation straightened out. Italy has been going on since October and there is no improvement whatsoever.

Senator STEVENSON. Do you find Commerce and State and other agencies of the Government helpful, or do they offer as much assistance as they might in such situations as you have described?

Mr. LEVY. State in the textile area has been of assistance to us a number of times. And they do call us periodically to ask about problems we are facing.

We have gotten very little from Commerce over the years. In the case of the marking requirement, Commerce had no information to give us at all, they were of no benefit to us at all, we were just groping in the dark.

Senator STEVENSON. How will codes that evolve from the MTN reduce barriers that are disguised as ineptitude?

Mr. LEVY. It is going to be very difficult. Unfortunately things like this can be taken care of only by unilateral pressure from the U.S. Government. Italy has a tremendous favorable trade balance with the

United States. I think the United States should be able to bring to bear pressure on the Italians to require that import documentation be processed in a normal fashion. It doesn't take 45 to 60 days to process these documents, there is no reason for that.

When the French were doing it, we got a protest from the Department of State, we received a copy of it, and miraculously the problems evaporated 3 or 4 weeks later.

Perhaps it was fortuitous, but we like to think it was because of the intervention of the Government.

Senator STEVENSON. Ineptitude is probably one barrier with which we could retaliate. [Laughter.]

Mr. McClosky, how does an American exporter penetrate the Japanese distribution system which is dominated by the large Japanese trading companies? Even without the barriers, are we capable of penetrating that distribution system? Has anyone succeeded in doing it effectively?

Mr. McCloskey. I would like to ask Peter Levin to answer that question specifically, if I may.

Mr. LEVIN. I think, Mr. Chairman, the easy and fast answer is that it is not easy. It is very difficult. The problems that one faces—and I can speak from some personal experience in this—fall into a variety of circumstances.

This is what in our testimony we have taken as an illustration of defense in depth.

The first problem in many, many instances that one is likely to face is the matter of standards which appropriately, of course, are cloaked with such motherhood facets as safety to the consumer, if it is a consumer product, or if it is a component of some sort, safety involving factory discipline. Something on that order.

After that, the peculiar nature of the Japanese distribution system which both for domestic products as well as for imports, tends to be in the hands of singularly large trading companies, as you know. These, too, create a kind of most peculiar barrier.

One of the reasons for this is that the trading companies themselves, which have major access either on the first or second step of a distribution process, have very strong interrelationships both personal and financial on the one hand with Japanese manufacturers of what might be competing merchandise, and on the other hand, they frequently have a stake of financial ownership in, let's say, the major Japanese department store chains.

More typically, also, the trading companies have considerable interlocking financial relationships with the Japanese banking system, and consequently they are both subject to certain pressures as to payment for goods that might be imported into the distribution system, and conversely, they can affect the credit extension let us say to independent importers who might be forced to pay substantially higher interest rates, or put a much higher compensating balance in the bank than would be the case for any of these organizations.

I can't speak to this out of my experience in electronic parts, but I can in respect to some consumer appliances. We have found, for example, that a refrigerator—what we would call a standard budget box model in this country, about 14 cubic feet, which would sell at retail here, with all of the bells and whistles on it, at a maximum of

perhaps \$400 retail—will go for as high as \$3,000 in a Japanese department store. I can assure you that we can, at least in the case of my company, we can land—

Senator STEVENSON. Does it reach \$3,000 if you use the current exchange rates?

Mr. LEVIN. That's right. That is retail. Remember, there are American distribution costs in domestic retail price, obviously, such as advertising, transportation, wholesale charges, sales commissions, warehousing, what-have-you. All of those are there.

And manifestly none of those are present in our price to the Japanese, which is not \$400. It is our normal price, and generally speaking, with today's methods of shipment, we can land the goods in Japan at approximately the same price as we can put them, let's say, into a warehouse out in California awaiting wholesale distribution. It is a marvelous and wonderful thing as to what happens and how that price gets built up.

We have made many attempts to try to figure out just how it is done. There are some instances that I can tell you what can happen.

Senator STEVENSON. What happens to the Japanese-manufactured refrigerator?

Mr. LEVIN. First of all, he is not building a comparable refrigerator. He is building a much smaller box, and his box goes on the market in Japan at approximately \$400. That is a 6-foot box, and I am talking about a 14-foot box.

Senator STEVENSON. And over here it would be about \$200?

Mr. LEVIN. Yes. The first thing that happens obviously we have to go through the tariff wall, which is not particularly onerous, but we have had a number of problems for a number of reasons. They refuse to accept our cords, consequently at one time we had to take those refrigerators apart in a duty-free area and reequip them with Japanese-produced cords.

Then, for no reason we can possibly think of, there have been complaints against the motors which drive the cooling fans in the refrigerator. These were deemed unsafe.

Now having produced millions and millions of them in the United States and not having had any failures, we couldn't exactly figure out why the windings were suddenly unsafe in Japan.

But that is the type of thing you run up against and that does build up some of the price, obviously. As it happens, refrigerators are acceptable in Japan.

In the case of our industries here, and the television industry, they use exactly the same standards as we do, or so close there is virtually no cost in producing a U.S. television set that is different from producing one for Japanese usage.

Our general experience has been, one of them in particular, Zenith, I know to my direct knowledge, tried three times to get into this distribution of television sets, U.S.-made television sets in Japan. They found it was impossible. They could not find themselves a distributor who would handle them, the cost of setting up one's own distribution in Japan for a single product or very limited line of products, given that distribution system, and the need for banking relationships, is just about impossible. It is certainly uneconomic.

But it is true that we can, with persistence, get goods into that market. But the markup on imports that occurs within the structure in Japan is so great and so high that in essence what we would call mass merchandise here, becomes luxury goods over there.

Senator STEVENSON. Do we need trading companies like the Japanese have?

Mr. LEVIN. I think we would have, first of all, a number of pretty severe legal problems in this country.

Senator STEVENSON. Let's assume if we do need them that we can correct the legal problems, obviate them.

Mr. LEVIN. Well, if you assume that, Senator, that means that we are going to get all kinds of antitrust relief that we can't quite get, and that the banking laws of the country are going to be changed quite considerably.

Senator STEVENSON. Well, let's start with the need. If there is a need, maybe the laws could be changed. That is what we are here to do, that is our function here.

Mr. LEVIN. I don't think there is any question but what that would improve our export ability. Similarly, it would probably in some instances help with respect to some of the prices we pay for imports, because the Japanese trading companies, of course, go both ways. They import as well as export. And they do, as you know, have independently owned, in third countries, various production facilities.

Senator STEVENSON. A Japanese official told me not long ago that American industry would help itself penetrate the Japanese market if it just did such elementary things as putting the instructions on refrigerators in Japanese, so they could read them.

How do you respond to that? I just used the refrigerator as an example.

Mr. LEVIN. Was it a question that penetration of the market was a matter of adapting to their requirements?

Senator STEVENSON. Yes; it might comply with the requirement, but if the printed instructions could be in their language, so it could be understood.

Mr. LEVIN. I am terribly sorry, my hearing is bad this morning.

Senator STEVENSON. It is not just adapting to the requirements, it is marketing, printing the instructions, for example, that accompany the product, in Japanese, so that the potential customer can read it.

Mr. LEVIN. Well, I have no doubt that sometimes the instructions have gone with some goods that have not been as clear as they might have been. The same, of course, has happened coming the other way, on occasion, and I am sure all of us can recollect that, and that is bad marketing, I agree.

The possibilities of American companies being able to do that would seem to me to be pretty substantial. There shouldn't be any problem in finding sufficient skills to either translate or, indeed, many American companies do have Japanese employees who are fluent in the Japanese language.

Senator STEVENSON. Mr. Cline, does this discussion change any of your calculations? You predicted a very substantial increase if MTN were to get what you expected. Even if it does, we are going to be faced with some problems, aren't we?

Mr. CLINE. The calculations are of an "other things held constant" nature. To the extent that all of these restrictive practices existed in the past, and we still achieved the export base in the face of those restrictions, one would not expect the calculations to change. I think the point is that if some of these restrictions were reduced, then our estimates of export effects could be increased, to include the effect not only of the relaxing of tariffs, but also expediting administrative processing, and changing the nature of the distribution system.

I think it is important to point out that in the particular case of textiles, the protection we face on our exports doesn't occur in a vacuum. The entire industry is the most protected industry worldwide, and when other countries exercise various kinds of restrictions on our textile exports they do so in the context of the fact that that industry, including our own imports, is severely restrictive.

Senator STEVENSON. How do we go about changing these discriminatory practices, including the ineptitude of the Italian bureaucracy, which is a little outside the MTN?

Mr. CLINE. In the case of Japan, as I mentioned, I think the United States-Japan trade facilitation group represents a vehicle for exploring questions such as why the markup is so enormous on Japanese imports, what possible institutions could be constructed to chip away at that, and whether there is some possible marketing mechanism that could be set up perhaps with U.S. Government assistance, for getting around the distribution problem; and if the Japanese are serious about their intentions to increase imports, one would think there ought to be some scope for action.

In terms of many of the descriptions of the restrictions on the standards, such as the example of allegedly faulty electrical cords, it seems to me that the negotiations on codes of conduct that the Tokyo round is pursuing should make a considerable difference in the application of standards, so that we can hope for some relief from these artificial restrictions in this area.

Senator STEVENSON. You said that the U.S. share of trade benefits derived from the negotiations would be about \$40 billion, and those benefits could rise by as much as one-third if one were to include calculations concerning the macroeconomic gains made possible through reducing unemployment.

Is there any analysis that measures the effects of import restrictions on inflation?

Mr. CLINE. Yes; in fact we have calculated the direct impact of cutting tariffs by 60 percent on U.S. prices, on the Consumer Price Index, considering the weight of imports in overall U.S. supply, and it would be worth somewhere on the order of one-third to one-half of a percentage point.

Senator STEVENSON. A 6-percent cut?

Mr. CLINE. No; a 60-percent cut in tariffs. In other words, the full U.S. authority. So it is somewhat higher than the Swiss formula, which is a 40-percent cut.

Senator STEVENSON. But it would be worth a half to a third of a point?

Mr. CLINE. It would be worth a third to a half a point on the Consumer Price Index. That is a very conservative estimate, because it assumes that prices only decline for the import itself, whereas it is

also likely that the entire domestic price structure would be faced with reducing its prices because of the cheaper competition.

Now the thing about reducing prices is they have a very powerful impact on GNP, because even with a small reduction in price, there is considerably more leeway to pursue full employment policies, without fear of inflation.

And full employment can add enormous amounts to the gross national product, even for a small percentage relief on the inflation front.

So that essentially what is an opportunity in the negotiations is to provide yet another mechanism for helping the United States to achieve full employment, and other countries, for that matter, through the function that imports play of restraining inflation and permitting the country to follow more aggressive full employment policies.

Senator STEVENSON. You say that agricultural nontariff barriers are the most formidable for U.S. exporters. And you also sound the most pessimistic about them.

What are the grounds for that pessimism, and what more can be done?

Let me just say what I wasn't explicit about earlier, that it is much more efficient to export meat than to export the feed grains for the purpose of trade liberalization, to make an efficient allocation of resources in the world, and I think there would be benefits on all sides from exporting meat to a larger extent, and to that extent reducing the export of feed grains. Why the pessimism and what can be done?

Mr. CLINE. I think the pessimism about agricultural nontariff barriers being liberalized stems from the fact that this area is, especially in Europe and Japan, an area of tremendous political clout by the vested interests.

As I understand it, the representation in the Japanese Diet by rural communities is far in excess of the other groups. The same kind of overrepresentation or certainly political clout seems to be true for Europe as well. And in fact my impression is until Ambassador Strauss made a certain gesture, approximately 1 year ago, that the United States was not going to insist in the Tokyo round that the entire Common Agricultural Policy be demolished, until that gesture was made, these negotiations just weren't moving at all.

I think there are some areas of possible achievement on agriculture in these negotiations. I think we are getting closer to an agreement on grain reserves, for example with the EEC.

But I think the principal concern I have is that we not jettison the entire set of negotiations by insisting on completely freeing trade barriers in agriculture, especially when we are not prepared to put our own house in order, we are not prepared to pay the political costs domestically of liberalizing dairy products, and liberalizing meat imports.

So the short answer as to why I am pessimistic is that the opposition to liberalization in this area just seems more entrenched than in other areas.

I agree if liberalization were achieved it would permit more efficient allocation of resources. The basic changes that would probably occur are that we would export more grains, and the Europeans would export more beef. They have less land, which is what it takes to grow grains, whereas livestock can be raised on a feedlot basis which doesn't

require as much land. Therefore, one would tend to see a specialization of the Europeans in beef production, and beef exports, and of the United States in grain exports.

I think that kind of specialization would benefit the entire world. Obviously we have got to do as much as we possibly can to start working in the direction of that greater efficiency.

I just don't think one can be terribly optimistic about how far we will accomplish that objective.

Senator STEVENSON. I am not sure that would happen. That grain could also go very efficiently into American feedlots and the beef, instead of the bulky grain, could be exported.

Mr. CLINE. That is conceivable.

Senator STEVENSON. A final question: It has been estimated that for each \$1 billion in additional U.S. exports, about 40,000 jobs gets created. Do you have any estimate as to how many jobs get lost for each additional \$1 billion of imports?

Mr. CLINE. It is probably close to the same ratio. Under the Swiss formula we have a loss of U.S. import jobs on the order of 90,000 jobs, and we are probably talking there about something on the order, of imports amounting to \$2.5 or \$3 billion.

So it is more or less on that same general ratio. If anything, our imports tend to not involve quite as many jobs per dollar, except for some very labor-intensive imports. In general, our exports incorporate a lot of human skills. There are many studies which explain the paradox that our exports, if anything, use more labor than our imports. Whereas one would think that because we have a lot of capital and land, our exports would use less labor.

The paradox is explained by the fact that our exports, products like computers, incorporate a lot of jobs that are sophisticated in scientific terms.

But I think in broad terms, the number of jobs per billion dollars trade is comparable for our exports and our imports.

I can certainly provide more detailed calculations on that.

Senator STEVENSON. Fine. Thank you, gentlemen, for your helpful testimony.

The meeting is adjourned.

[Thereupon, at 12:40 p.m. the hearing was adjourned.]

[Additional material received for the record follows in the appendix.]

APPENDIX

STATEMENT OF
THE AMERICAN ELECTRONICS ASSOCIATION
(Formerly WEMA)
BEFORE THE
SENATE COMMITTEE ON BANKING, HOUSING & URBAN AFFAIRS
SUBCOMMITTEE ON INTERNATIONAL FINANCE

MAY 16, 1978

The American Electronics Association (AEA), formerly WEMA, is pleased to have this opportunity to offer its views on the competitiveness of U.S. high technology exports in view of declining research and development expenditures by U.S. government and industry. We believe this is also a good opportunity to comment more broadly on the general topic of U.S. export performance and export policy, the subject of this Subcommittee's overall study and series of hearings.

AEA commends the Subcommittee on International Finance for initiating this comprehensive study. Certainly it is timely because the problem of the U.S. trade imbalance is visible and pressing. We believe the current situation and potential future export performance problems require affirmative action by the U.S. Government.

The American Electronics Association, based in Palo Alto, California, is a trade association representing more than 940 high-technology electronics companies in 39 states. A preponderance of AEA companies are small to medium in size, with more than two-thirds employing less than 200 people.

AEA member companies share a common interest in that they are all engaged in sophisticated electronics and information technology. AEA companies design and manufacture components and equipment for a number of end markets. Some of the types of products AEA companies manufacture are:

- Semiconductor devices such as transistors, diodes, integrated circuits and microcomputers used in a wide and growing variety of business, military, scientific and consumer end products.

- Electronic test equipment such as oscilloscopes, signal generators, counters and voltmeters used in numerous applications.
- Computers and computer peripheral equipment for business and scientific applications, and calculators.
- Components such as tubes, resistors, capacitors and similar items.
- Sophisticated telecommunications equipment and systems such as radio transmitters and receivers, satellite electronics, signal switching equipment, etc.

The current competitive situation in the high-technology electronics industries should be viewed in historical perspective. In the 1950's and 1960's our member companies operated in an environment which fostered growth and innovation. Markets at home and abroad were eager for new products. Several foreign countries welcomed advanced electronic capital equipment to restore their war-ravaged industrial plants and communications systems. U.S. industry came out of the war with a substantial lead in most areas of technology. The Federal Government provided strong support for technology in several areas, including grants to universities for basic research and contracts to industry to maintain our military technological lead and support a major space program. High technology companies could find equity capital to finance new ventures and technologies. There were few foreign competitors to seriously challenge the American technological lead in electronics products. And our high technology companies were not overburdened by federal and state regulations. In this climate, most AEA member companies were successful in developing and maintaining technological and thus product leads over foreign competitors.

International trade became increasingly important for AEA member companies as the worldwide market for high technology products grew. In fact, exports now approach 25% of all U.S. manufactures in the electronics industries. In 1977 total U.S. exports of high technology electronic-oriented products were \$8.92 billion with a positive trade balance of \$1.2 billion (source: U.S. Department of Commerce). The sales of our high technology products abroad has been one of the brighter areas for U.S. exports.

However, starting in the early 1970's, the commercial and export environment for high technology electronics companies has deteriorated and put into serious question whether our companies will continue to maintain their competitive position. The increasing diversion of economic resources to the government, in the form of higher taxes, has reduced those available for industrial innovation; the bias of the tax system for consumption and against investment has caused equity capital to become scarce; regulatory burdens on companies have increased; Federal grants for university research have declined in real terms and have been directed toward medical sciences; the space program has declined and military research and development has not kept pace with inflation. In addition, many obstacles have been thrown up by Congress and the Administration that inhibit exports and hinder U.S. companies' ability to compete abroad. For example, DISC and deferral are under attack; and foreign policy and human rights considerations make for an increasingly uncertain foreign marketplace for U.S. companies. In general, U.S. industry and government often seem to be adversaries. And despite the fact that exports are increasingly critical to the U.S. economy, U.S. trade policy hinders rather than encourages this important sector.

Research and Development in the United States

Recent studies indicate that over the last decade or so R&D efforts have been declining in the U.S. relative to overall industrial activity. The National Science Foundation's report "Research and Development in Industry, 1975" (NSF 77-324) indicates that total industrial R&D funds (including government contracts) has declined in constant dollars around 1% per year between 1965 and 1975. In 1975 funds were 4% less than 1974 in constant dollars. This report also indicates that total industrial R&D funds as a percent of net sales has steadily decreased from a high of 4.6% in 1964 to 3.1% in 1975. In the electronic components/communications equipment categories, the percentage decreased from 13% to around 7% during the same period. The NSF attributes this decrease to lower levels of government R&D support to industry since the late 1960's.

The National Science Board's report "Science Indicators, 1976" shows that U.S. R&D as a percentage of GNP has been on the decrease in the last ten years,

while Japan's, for example, has increased. This report also indicates that federal R&D support has declined since 1967 in constant dollars to a point 18% below the 1967 figure.

This report also clearly demonstrates the importance of high technology manufactured products for the U.S. balance of payments. The trade balance for these products has been positive and generally rising from 1960-1975, with a leveling off occurring in 1976. In contrast, the trade balance in non-R&D intensive manufactured goods was near zero in the early 1960's but since 1964 the long-term trend has been an ever increasing deficit. The report shows that several products have become increasingly important for the favorable balance of trade: electronic computers, electronic tubes, and semiconductor devices. It notes the dynamics of high technology exports are partly explained by the "product cycle" concept which implies that the product structure of U.S. exports must have a "continuous infusion of new products for the U.S. to maintain a favorable trade position."

At the same time as the U.S. environment for strong R&D and export performance has deteriorated, the environment for our competitors in the industrialized countries has improved, and is much more conducive, especially in the high technology areas, to growth, innovation and competitiveness. While the U.S. Government adds restrictions and hampers exports, our competitors abroad receive government encouragement and support. Specifically in the high technology electronics area, a number of foreign governments are assisting their industries in research and development for high technology product exports. Left unchallenged this will displace the U.S. competitive lead in many product areas.

The Japanese example is particularly instructive and, since many countries are watching and may well emulate Japan, it's worthwhile to consider it in some detail. In doing so, AEA's concern for the future of U.S. high technology will become clear as will our belief that the U.S. Government should assist, not hinder, the ability of its high technology firms to innovate, grow and export. In the final analysis, the health of our industry depends heavily upon exports. Conversely, the health of our exports and the subsequent ability of the U.S. to pay for necessary imports, is dependent on innovation and growth.

The Japanese "Model"

The Japanese Government and industry have targeted high technology electronics as a prime growth and export area. The intent is to overcome the U.S. technological lead in several key sectors, notably semiconductors and computers. This effort may lead to the same result as in the consumer electronics area. We draw the Subcommittee's attention to several important elements of the Japanese "model."

- The Japanese Government is subsidizing a research program to overtake the American lead in semiconductor technology and introduce the next generation of Very-Large-Scale-Integration (VLSI) semiconductors. Current generation semiconductors are used in a variety of applications, especially in computer products. In the future, VLSI semiconductors will be used in a much broader array of products ranging from industrial controls and measurement instruments, telecommunications equipment, automobiles, home appliances, medical and hospital equipment, and other products.

Engineers and scientists from the top five Japanese electronics companies cooperate in the basic research. The results of this research will be turned over to the companies for development into the various commercial products. Fujitsu, Hitachi and Mitsubishi, who have formed the Computer Development Labs., Inc., will work together to translate the basic research into semiconductor products with higher levels of integration. Nippon Electric and Toshiba, which have formed the NEC-Toshiba Information Systems, Inc., will cooperate in developing semiconductor-based very high density memories for computers.

The amount of money would appear small compared to the amount of money American industry has invested in R&D over the years to develop next-generation semiconductor technologies. However, the government's \$250 million contribution must be viewed in light of several factors. One, the subsidized joint R&D program avoids the tremendous financial costs involved in numerous companies conducting parallel research and development (as is the case with U.S. companies). The result will be made available to every company in that area. Two, the fact that the Japanese Government organized and directs this project is also a signal to other Japanese companies in

fields related to the semiconductor and computer areas (e.g. manufacturers of end products to contain VLSI chips, VLSI production equipment manufacturers, etc.) as to where they should focus their current and future R&D and marketing strategies. Again, much duplicative expenditure of resources are avoided.

We must emphasize to this Subcommittee that this program, unlike any in the U.S., is a government-subsidized and coordinated program to develop commercial products for export. Such a program would be illegal in the U.S. due to our anti-trust laws, and is contrary to the fundamentals of our free enterprise system. The Japanese claim that U.S. military research and development programs are the equivalent. But in our experience U.S. military, mission-oriented programs have produced only moderate spinoffs or fallout for the commercial product sector. In fact, it is clear that U.S. commercial technology is running ahead of military technology in many areas, including semiconductors. This new pattern of leadership means, of course, even less fallout than before.

- The Japanese market for U.S. high-technology electronics products has been extremely limited by a variety of tariff and non-tariff barriers. Whether because of high tariffs (12% for integrated circuits, 10.5% for computers and 17.5% for microsystems and computer peripherals), deep-rooted "buy Japanese" attitudes of potential Japanese buyers, governmental "administrative guidance," the extremely difficult marketing and distribution system, or a combination of these and other factors, the Japanese manufacturer of competing products greatly benefits from the closed market.

In the semiconductor area, for example, it has been extremely difficult for a U.S. semiconductor component manufacturer to sell to Japanese computer manufacturers. The Japanese semiconductor manufacturer, lured by an assured market and at least indications from the government (or even direction) that he is doing the right thing, is able to quickly achieve volume production and reduce costs as all elements of economies-of-large-scale-production are fulfilled.

Due to import barriers, government rationalization and allocation of production, a Japanese firm does not face the stiff competition that

American companies do during these stages. The Japanese firm is then able to quickly move into the export market with very competitively-priced products. For example, according to statistics gathered by the Semiconductor Industry Association (SIA), in 1973 Japan exported \$10 million integrated circuits. By 1977 they exported \$107 million, while during the same 5-year period, U.S. exports of integrated circuits to Japan rose very little. Japanese exports of discrete devices rose from \$78 million in 1973 to \$206 million in 1977, while imports from the U.S. of these products rose hardly at all during this period. SIA statistics show that Japan may be now exporting more semiconductors to the U.S. than vice versa if semiconductors within finished products are included. According to U.S. Department of Commerce statistics, from 1975 to 1977 the U.S. trade deficit with Japan in electronic components increased from \$52 million to \$238.5 million.

These figures demonstrate what appears to be the strength of the Japanese "model" in operation. On a broader scale, the overall U.S. trade surplus in electronic components declined 43% in 1977 over 1976, with the overall trade surplus in semiconductors dropping from \$292.1 million to \$150 million in 1977 over 1976.

This portends extreme competitive challenges for not only the semiconductor industry, but for those U.S. end product manufacturers who employ semiconductors as components. Such products are numerous and growing. The Japanese computer manufacturer, for example, will be able to export a product whose components are purchased relatively cheaply. Of course, this will also put pressure on U.S. end product manufacturers to try to lower their component costs as well, and possibly turn to imported components to meet the imported equipment challenge.

Thus, the Japanese competitor benefits from a "subsidized" learning curve in the form of subsidized and allocated commercial research and development programs, and a subsidized product "cost curve" in the form of a closed domestic market. Japan has targeted the high technology electronics industry. Without an appropriate U.S. response it can very likely expect to go the same way as the U.S. consumer electronics industry.

The U.S. must respond to this challenge. But we shouldn't use the Japanese "model" of import barriers and government organized and subsidized commercial research. We are free traders and do not see higher tariffs, quotas or orderly marketing arrangements as the answer. Rather, the U.S. should take advantage of the attributes of its economic system that, when given a reasonable environment, will outperform other economic systems challenging its supremacy.

U.S. Response

We believe the U.S. Government needs to put together a cohesive program to ensure that world trade prospers and that U.S. industry has an export environment to provide it an opportunity to participate fully in this prosperity. We propose the following elements for a U.S. export policy:

- The U.S. should develop a national policy that explicitly recognizes the importance of U.S. exports to the U.S. economy. Such a policy would require that the Federal Government factor in the effects on the ability of U.S. industry to compete in world markets when making decisions on fiscal and regulatory matters.
- The U.S. should take a firm position on the Multilateral Trade Negotiations to remove or greatly reduce the tariff and non-tariff barriers to U.S. high technology product exports, especially those of Japan and the EEC. What appear as low-cost Japanese exports due to superior production techniques are actually to a great extent low-cost due to the benefits of the Japanese closed market. Japanese and other foreign manufacturers of high technology products should be subject to the same competition U.S. manufacturers are. This certainly is in keeping with the spirit of free trade and the rules of GATT, which we believe should apply equally to all participating countries.
- The U.S. should respond to foreign government-subsidized R&D by providing a more favorable climate for R&D here in the U.S.
- To remain competitive in world markets for high technology products, our

high technology electronics firms must be able to continue to innovate and develop new technology-intensive products. The question for a high technology company management, especially for the company facing fiercer price competition, is how much of its cash resources it can afford to budget for research and development. If the most pressing problem is short-term survival in the face of competition, what little R&D resources available may be concentrated on short-term product improvements or modifications at the expense of longer-term, new product development or innovation. The important point is that continued competitiveness of U.S. high technology firms, especially of smaller ones, requires the ability to finance R&D from profits or available capital.

AEA believes that the Federal responsibility in this area should be one of encouragement and indirect financial incentives to enhance the climate for innovation rather than specific direction and direct funding.

We propose the establishment of a significant, say 150%, tax deduction for a corporation's research and development expenses. This is high enough to encourage substantially increased private R&D efforts, and yet, since total privately financed industrial R&D is only about \$16.4 billion per year, it is low enough to limit the immediate loss in Federal taxes to a manageable proportion.

It should be noted that these tax losses would be short-term in nature, and would be more than restored in a relatively brief time through increased industrial activity. It might be politically advantageous to limit the total R&D tax deductions available to a single company to \$15 million or some other ceiling. This limitation would tend to favor smaller companies, and would be responsive to indications that a disproportionate share of important developments come from small laboratories.

We also believe that because of the nature and increasing sophistication and cost of R&D capital equipment, it deserves special tax consideration. This could be given in the form of a special investment tax credit. It should be at least 30%, or three times the current tax credit (10%) which is accorded to other capital equipment. An alternative would be to

recognize the fact that R&D equipment tends to have a short life span, and is often obsolete after a single project. Full depreciation in one or at most two years would be appropriate.

In this connection we point out that the Canadian government has recently proposed tax incentives to encourage industrial research and development. The government proposes to allow deduction from income of 50% of the costs of increased research and development activities, raising the total immediate write-off to 150% of actual expenditure. We also note that Japan gives tax credits (up to 10% of a corporation's tax) for increasing research and experimental costs and for training costs for programmers and system engineers for electronic computers.

- The U.S. should review the role of the Federal Government in basic research, with a view to establishing procedures which will ensure that the university grant program retains its viability.
- The U.S. should review current disincentives toward industrial research and development existing in the government procurement area such as:
 - a) Limitations on company recovery in product prices for R&D programs when a company contracts to manufacture and sell a product to the government, and the Defense Department "military relevance" requirements required by Congress for R&D cost recovery. Both these measures are counterproductive and discourage innovation.
 - b) Federal patent policies under which many federal agencies, DoD excepted, require that the government receive title to patents resulting from work on government contracts. At first glance this policy might seem to be logically justified on the basis that inventions resulting from the use of public funds should belong to the public. However, such a policy fails to recognize the realities of product and market development. It is unlikely that a company will undertake extensive development, production or marketing activities if it lacks the patent protection necessary to insure the success of the product. The U.S. public will not develop and capitalize on a patent belonging to the U.S.

- The U.S. should modify U.S. tax laws to encourage capital formation. The availability of capital to finance growth and innovation greatly impacts our high technology companies' ability, especially the small-to-medium size firms, to compete both here and abroad. Unfortunately, there is and will continue to be a capital shortage unless changes are made to the tax laws to encourage equity capital investments by individuals. The maximum capital gains tax rate should be reduced to its pre-1969 levels of 25%.

AEA recently surveyed its member companies on their capital formation experiences. The study clearly documents that in the high technology electronics industries, since 1970 the availability of equity capital has been greatly reduced. This survey showed that firms founded between 1971 and 1975 were able to raise one-half as much equity capital on the average as those firms founded during 1966-70, and actually less than firms founded between 1961-1965.

The survey also shows that for the 15 years prior to 1970, the debt-to-equity ratio of firms founded during those years was about 1:1, in 1976 the debt-to-equity ratio of firms founded in the period 1971-75 averaged more than 2:1. The consequences of this are that the formation and growth of young and innovative companies has been stifled. Those able to get started are more vulnerable to economic downturns, and in order to get needed equity risk capital are more susceptible to being bought out by foreign competitors.

The AEA survey indicates that the elimination or reduction of capital gains taxes would increase employment, R&D expenditures, export sales, and Federal tax revenues. These tax changes would bring us more into line with our major competitors, Germany and Japan, who effectively do not tax individual long-term capital gains.

Last week Senator Hansen of Wyoming, along with 60 Senators, some of them on this Subcommittee, introduced S 3065, a bill to reduce capital gains taxes to their pre-1969 levels. We are strongly encouraged by this event. We are urging that the Senate and the House of Representatives pass this vital legislation this year and take a major step toward revitalizing

capital formation, innovation, and exports.

- The U.S. should improve its export control system. With respect to exports to the Communist countries, the ability of U.S. high technology exporters to compete has been hampered by an export control system fraught with uncertainties and delays. This Subcommittee is, of course, quite familiar with this problem area. We commend its efforts over the years to improve the Export Administration Act to provide for quicker licensing decisions, greater governmental accountability for those decisions and more extensive and effective Congressional oversight.

Sales of non-strategic, high technology products in expanding markets, whether communist or noncommunist, provide revenues for U.S. companies which support further growth and innovation. The existing rigid and inefficient U.S. export control system handicaps U.S. exporters. Under the circumstances our foreign competitors are better able to supply these markets, and as a consequence our high technology exporters are damaged. Although communist markets are now relatively small, in great part because of the U.S. export licensing problem, they are capable of great growth.

We strongly recommend that the administration of U.S. export controls be streamlined to allow our high technology companies to compete more effectively in peaceful goods with foreign firms in the USSR, Eastern Europe and the P.R.C. We agree with the thrust of Defense Secretary Brown's memorandum of August 26, 1977, emphasizing controls over critical technologies and deemphasizing product controls. Appropriately implemented this might eliminate the lengthy and often unnecessary delays for the vast majority of U.S.-manufactured commercial exports to the communist countries. Whether or not this approach is eventually adopted, the U.S. should support raising current CoCom product control thresholds to realistic levels in the upcoming CoCom list review. This will remove many obsolete controls over products available from other Western countries and from the communist countries themselves. Raising the thresholds will allow U.S. exporters to avoid the lengthy licensing process for these products and enable them to more effectively compete with Japanese and European firms not so burdened.

We do not believe that controls should be placed over transfers of critical technologies to Western countries, especially to U.S.-related parties therein, unless there are clear indications the recipient is unable to control retransfers of the technology to adversary countries. Such controls would seriously disrupt a U.S. high technology company's ability to manufacture and supply foreign markets abroad. By logical extension, such a policy would involve unilateral restrictions over the movements of technically-qualified people and data in the West.

- The Domestic International Sales Corporation (DISC) and the tax deferral provisions should be retained because they contribute to the ability of our high technology companies to compete and expand in world markets. DISC partially offsets the numerous direct and indirect subsidies foreign competitors receive from their governments. It has given U.S. companies, especially smaller companies, the needed incentive to enter into and expand exports. The profits derived from these added export sales provide funds for further innovation and growth and thus enhance future U.S. competitiveness.

The ability to defer taxes on unrepatriated income earned abroad should be maintained. Profits earned abroad are invested in sales and service activities vitally needed to support U.S. exports. To subject such income to U.S. taxes before repatriation would place U.S. firms at a competitive disadvantage. The income our foreign competitors earn outside their respective countries is not taxed currently and thus is used to support those activities. When exporting is no longer adequate, for the most part AEA member companies invest abroad for competitive reasons. Elimination of deferral will likely result in foreign governments raising these taxes (against which U.S. companies receive a credit against their U.S. tax liability) so that they, and not the U.S. Government, benefit from any increased taxes on business operations in these countries. No other country taxes foreign source income on a current basis until repatriated. Many countries do not tax it at all.

- The U.S. should retain tariff items 806.30 and 807, or better yet should replace them with a more basic system of changing duty only on value added. These tariff items are critical for the high technology

electronics industry and allow U.S. companies to manufacture components here in the U.S., have them assembled abroad, and not pay duty on the American content when they are returned to the U.S. These products are then further manufactured, sold in domestic markets or exported in competition with foreign products. This tariff treatment allows U.S. companies to produce competitively-priced, high-quality products.

Offshore assembly of semiconductor and other electronic products is absolutely necessary for competitive reasons. The principal foreign competitor in these products is Japan, whose firms also assemble their products offshore and pay little duty when the assembled product is returned for further manufacture and sale.

Semiconductor technology is extremely fast-moving and automated assembly is not practical given the fact that a product can become obsolete long before capital equipment can be amortized. The existence of 806.30/807 enables the U.S. company to maintain most of the production process here in the U.S. If this tariff treatment were eliminated, much more of the production process would have to be moved offshore in order for a company to remain competitive.

- The U.S. should provide financial incentives for exports. Except for Eximbank financing of big-ticket export items, there is a very notable absence of programs in the U.S. to provide its firms with favorable loans to encourage exports. On the other hand, foreign governments offer a wide variety of loans and assurances to foreign buyers as well as domestic manufacturers of articles for export.

The U.S. Government should develop programs to provide "soft" favorable loans, as well as other types of financial incentives, to U.S. firms, especially small and medium size ones, for the manufacture of goods for export. "Soft" loans should also be made available to foreign buyers of such goods. This could be done through the Small Business Administration or Eximbank channels, and would provide incentives to enter export markets. Once there, a firm's competitive situation would be enhanced.

Smaller companies face problems when they consider exporting for the first

time. It is much easier and cheaper for a small or medium size company to operate domestically because the U.S. is the largest market in the world, and because the risks, laws, language, competition and the market itself are generally known. Consequently, a small high technology firm must consider whether one dollar invested in selling overseas will yield equivalent results as one invested in selling here in the local market. Usually, the answer will be not to export. The risks and costs of starting up exports are greater. Favorable loans for manufacture of export goods or foreign buyers would help to remove this inherent export disincentive.

Another related recommendation would be to provide greater tax deductions, for expenses incurred for overseas marketing costs and outside international marketing consultants. For a small company entering a foreign market, the initial marketing costs can be prohibitive given the uncertainties, and expert assistance is often crucial for ultimate success. These recommendations would contribute to a greater volume of more competitively-priced export products.

Conclusion

In sum, high technology electronics exports play a very crucial role in the U.S. economy. We now face a very serious competitive challenge brought about by a combination of a deteriorating U.S. export climate and foreign competition from firms aided by their governments.

The U.S. must respond by fostering an economic climate more conducive to economic growth, industrial innovation, and export growth. We were greatly encouraged by President Carter's appointment of a Cabinet-level task force, headed by Commerce Secretary Kreps, to develop recommendations for a U.S. national export policy. We hope that the Congress, aided by this Subcommittee's efforts, together with the Presidential Task Force, can bring about changes in U.S. policy necessary for the high technology industries to play the strong export role of which they are capable. In summary, we recommend that these policy changes should include:

- 1) Requiring that U.S. fiscal and regulatory decisions factor in impacts on our industries' international competitiveness.
- 2) Taking a firm stand in the MTN to reduce tariff and non-tariff barriers to U.S. high technology exports.
- 3) Stimulating U.S. industrial R&D by providing greater deductions for R&D expenses, greater investment tax credits for, and faster depreciation of, research equipment.
- 4) Revising U.S. Government procurement policies to provide more incentives for industrial R&D.
- 5) Stimulating investment, innovation and exports by lowering capital gains taxes to their pre-1969 levels.
- 6) Streamlining the U.S. export control system and raising the outdated-obsolete CoCom thresholds to improve our high technology firms' ability to compete in the communist markets.
- 7) Retaining DISC and tax deferral of foreign source income as necessary ingredients for competitiveness in world markets.
- 8) Recognizing that tariff items 806.30 and 807.00 are critical for the international competitiveness of high technology electronics firms.
- 9) Providing financial incentives to encourage exports of manufacturers.
- 10) Providing greater tax deductions for overseas marketing costs.

AEA thanks the Subcommittee on International Finance for this opportunity to provide our views on U.S. export performance and policy. We would be pleased to answer any questions you might have regarding this statement, and look forward to working with the Congress and Administration to bring about better export performance.

COMMITTEE ON THE CHANGING INTERNATIONAL REALITIES

National Planning Association

RESEARCH AND DEVELOPMENTAS A DETERMINANT OF U.S. INTERNATIONAL COMPETITIVENESS

Rachel McCulloch

Harvard University

March 1978

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RESEARCH AND DEVELOPMENT
AS A DETERMINANT OF U.S. INTERNATIONAL COMPETITIVENESS

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I. Introduction

The United States has long occupied a position of acknowledged world leadership in science and its industrial application. However, American technological pre-eminence has not remained unchallenged. In 1957, the Soviet Union's Sputnik triumph shocked the nation. The fears engendered by Sputnik resulted in massive new public support for research and development and for education of the scientists and engineers required to carry out the new programs. More recently, commercial rather than strategic aspects of competition from abroad have become the focus of concern. High technology products continue to make a consistent and important contribution to U.S. trade performance, but significant technological gains by U.S. trading partners have aroused fears that the strength of the American economy may be in danger. Critics of U.S. policy, pointing to diminished Federal support for research and development, increased restrictions on the introduction of new products, and accelerated transfers abroad of advanced American technology, have called for positive measures to maintain U.S. technological superiority.

Technology has played a major role in America's transformation from a small, primarily agricultural economy into the foremost industrial power of the modern world. The nation's development reflected the combined impact of three major forces: rapid population growth through both immigration and high rates of natural increase, territorial expansion, and steady gains in productivity associated with continuing technological innovation.¹ The role of technology in American economic growth can be divided into three phases. Until well into the nineteenth century, American entrepreneurs expanded output per capita by adapting to local conditions innovations originating primarily in Europe, particularly Great Britain. By the end of the Civil War, American technology was on a par with that of Europe, and American inventors began to add in a significant way to the rapidly expanding world stock of technical knowledge. Finally, in the years following World War I, the United States gradually assumed a still more active role in the production of new knowledge, until in the post-World War II era the nation emerged as the unquestioned world leader in research and its industrial application.

During the 1950s and 1960s, U.S. private and government spending for research and development (R&D) soared, increasing fivefold in current dollars and threefold in real terms. As a percentage of gross national product (GNP), total R&D expenditures rose from 1.5 per cent in 1953, peaking at 3 per cent in the years 1964-1967. At the same time the share of education in national income also rose rapidly, resulting in important increases in the educational attainments of new labor force entrants and in the supply of scientists and engineers.² Although motivated largely

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by other considerations, these investments in R&D and skilled manpower were reflected in the nation's trade statistics. Until the early 1960s, the overall U.S. trade balance showed a persistent surplus, with particularly strong performance in the high technology industries. During this period, the "technology gap" between the United States and Europe was the focus of much concern on both sides of the Atlantic. Europe saw itself falling ever further behind, eventually becoming an "economic and technological colony of the United States."³

Unforeseen developments led to a rapid change in this picture. As the postwar recovery proceeded, other industrialized nations were able to increase their expenditures for research and development. Over the same period, the fraction of U.S. GNP devoted to R&D leveled off and then declined. By the early 1970s, a ~~number~~^{few} of countries had ^{actually} surpassed the United States in total R&D expenditures as a fraction of GNP, although the absolute level of U.S. spending still dwarfs that of its commercial rivals. (See Table 1.) At the same time, increased transfers abroad of advanced technology through foreign investment and licensing by U.S. firms also helped to narrow the technology gap. The orientation of foreign R&D differed markedly from that in the U.S., where defense and space exploration have constituted major priorities. Much of the activity abroad has been directed specifically toward the development of marketable products. Some countries -- notably Japan -- have concentrated their efforts on adaptation of imported technologies.

By 1971-1972, the overall U.S. trade balance showed a large deficit, although the high technology industries still fared relatively well. The

Table 1
Absolute Resources Devoted to R&D in OECD Countries, 1970-1971
 (million U.S. dollars)

High		Medium			Low	
Over 25,000	2,500-4,500	600-1,200	300-600	75-150	2-35	
U.S. 27,336	West Germany 4,499 Japan 4,041 France 2,920 United Kingdom 2,596	Canada 1,165 Italy 929 Netherlands 784	Sweden 538 Switzerland 486 Belgium 364 Australia 341	Denmark 143 Norway 112 Finland 91 Spain 78 Austria 78	Ireland 33 Portugal 24 Greece 18 Iceland 3	

Source: OECD, Patterns of Resources Devoted to Research and Experimental Development, 1963-1971, Paris, 1975, pp. 9-10.

combined trade surplus of the technology-intensive industries rose from \$7.7 to \$11.1 billion between 1963 and 1969, while the deficit for all other manufactured goods grew from \$1.0 billion to \$7.5 billion. Nevertheless, the evident success of Europe and especially Japan in displacing American manufactured goods in world markets for low technology products, an important source of concern in itself, has also led American businessmen and policymakers to anticipate similar encroachments in the markets for more sophisticated products as the U.S. technological lead is gradually eliminated.⁴

Although some observers have argued that these changes are merely the inevitable and even desirable consequence of growth and development abroad,⁵ the events of the past decade do raise important questions about the appropriate role of the U.S. government in fostering economic growth through policies to promote research and development. As direct federal expenditures for R&D have waned, there has been increasing attention to government policies which affect indirectly the profitability of industrial R&D undertaken by the private sector. Of particular interest are safety and environmental regulations, which appear to stimulate successful innovation in the private sector while slowing down the growth of productivity as conventionally measured.⁶

The purpose of this study is to shed light on a number of issues related to the appropriate role of government in fostering R&D and the possible implications of R&D policy choices for U.S. international competitiveness. Section II presents a statistical assessment of U.S. R&D activity in relation to that of other industrial nations. In Section III,

available evidence concerning the impact of R&D on economic performance is summarized. The current and potential role of government policy as a determinant of R&D is evaluated in Section IV. Conclusions emerging from the data and analysis are presented in Section V.

II. The State of U.S. Technology

An Overview of Current U.S. Expenditures for R&D

A total of about \$38 billion was spent for research and development activities in the United States during 1976.⁷ This figure represents an 8 per cent increase over 1975 in terms of current dollars, and about a 2 per cent increase in constant dollars. As a share of GNP, however, R&D has continued to fall from a peak of 3.0 per cent in the mid-1960s; the current share is 2.3 per cent. The declining fraction of GNP devoted to R&D is attributable mainly to a reduced rate of growth of Federal support, particularly in the categories of defense and space, over the past decade.

Research and development comprises a wide range of activities. Basic or pure research seeks to extend the boundaries of scientific knowledge. In the U.S., more than half of all basic research is undertaken in colleges and universities. In applied research, known scientific principles are directed to a specific practical use. Successful applied research typically yields a new product or process which may be of potential commercial value. Development, undertaken mainly in private industry, is concerned with solving production problems and improving product design.⁸ While there is a natural progression from a scientific breakthrough to its successful commercial application, applied research or development may also stimulate advances in basic science. For example, this can happen through accumulation of new information as a product or process becomes more widely used or as a result of unforeseen technological problems encountered

in translating a new product or process from the laboratory to the production line.

According to National Science Foundation estimates, \$4.8 billion of the 1976 total (12 per cent) was for basic research, \$8.9 billion (23 per cent) for applied research, and \$24 billion (64 per cent) for development. However, the allocation of expenditures among the three categories is necessarily somewhat arbitrary. Furthermore, the total R&D figure is subject to two systematic biases which lead to an understatement of the resources actually used for R&D activities by smaller firms and an overstatement for larger firms. In both cases, the source of the bias is the lack of a clear distinction between R&D, particularly development, and routine production activities such as quality control. Smaller firms with no separate R&D staff or budget allocation may nevertheless perform some R&D activities; likewise, the special R&D departments of larger firms are likely to carry out some routine functions related to current production.

The major source of R&D support is the Federal government, which currently supplies more than half of total funds, almost \$22 billion in 1976. This support is concentrated in a few areas, particularly those in which the Federal government is the major consumer. Spending for defense-related R&D in 1976 constituted about half of the total, with space (13 per cent), health (11 per cent), and energy (8 per cent) the next largest allocations. Table 2 gives a complete breakdown of total Federal support by function for fiscal year 1976. Non-Federal support for R&D was about \$18 billion in 1976, with industry providing \$16.6 billion, 92 per cent of the total.

Table 2

U.S. Federal R&D, Fiscal Year 1976

Function	Billions of Dollars	Per cent of Total
Total	21.6	100.0
National Defense	10.6	49.2
Space	2.9	13.3
Health	2.4	10.9
Energy	1.6	7.5
Basic Science	0.9	4.0
Environment	1.0	4.5
Transport and communications	0.7	3.3
Natural resources	0.5	2.3
Agriculture	0.4	1.9
Education	0.2	0.9
Income security and social services	0.2	0.7
Area and community development, housing, public services	0.1	0.6
All other programs	0.2	0.8

Details may not sum to totals because of rounding.

Source: National Science Foundation, Science Resource Studies Highlights, August 19, 1976, p. 3.

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Most R&D is performed by private industry -- about 70 per cent of all R&D in 1976, 54 per cent of applied research, 86 per cent of development, but just 16 per cent of basic research. In contrast, colleges and universities, which account for only 10 per cent of all R&D, perform about 55 per cent of basic research. The Federal Government performs 15 per cent of all R&D, 16 per cent of basic research, 25 per cent of applied research, and 11 per cent of development. The 1976 shares of total R&D effort by performing sector are shown in Table 3. Tables A1 - A3 give a complete breakdown of research and development effort by performer and source of funds.

Table 3

Performance of Research and Development by Sector

(per cent)

	Federal Government	Industry	Colleges and Universities	Associated FFRDCs ^a	Other Non-profit Institutions
Total R&D	14.7	69.6	9.6	2.8	3.3
Basic Research	15.8	16.3	54.7	7.1	6.1
Applied Research	25.2	53.8	10.3	4.3	6.5
Development	10.6	85.7	0.5	1.5	1.6

^aAssociated Federally Funded Research and Development Centers.

Details may not sum to totals because of rounding.

Source: National Science Foundation, National Patterns of R&D Resources, pp. 20-27.

Of industry-performed R&D, six industries -- aircraft and missiles, electrical equipment and communication, machinery, chemical and allied products, motor vehicles and motor vehicle equipment, and professional and scientific instruments -- accounted for 85 per cent of total expenditures in 1975. Table 4 gives a breakdown of 1975 industrial R&D by source of support and type of research for each of the six research-intensive industries, for other manufacturing, and for nonmanufacturing industries.

Table 4
U.S. Industrial R&D, 1975
(billions of dollars)

	Total	Sources of Funds		Allocation of Funds		
		Federal	Company	Basic	Applied	Development
All industries	23.5	8.8	14.8	0.7	4.4	18.4
Aircraft and missiles	5.7	4.5	1.2	0.0	0.6	5.0
Electrical equipment and communications	5.5	2.5	3.0	0.2	0.9	4.5
Machinery	2.7	0.4	2.3	0.0	0.3	2.3
Chemicals and allied products	2.6	0.2	2.4	0.3	1.0	1.3
Motor vehicles and equipment	2.3	0.3	2.0	0.0	0.1	2.2
Professional and scientific instruments	1.0	0.2	0.9	0.0	0.1	0.9
Other manufacturing	2.9	0.2	2.7	0.2	1.1	1.7
Nonmanufacturing	0.8	0.5	0.3	0.0	0.3	0.5

Details may not sum to totals because of rounding.

Source: National Science Foundation, Science Resource Studies Highlights, October 27, 1976, p. 2.

How Does the United States Compare?

The large absolute size of the U.S. economy and the nation's commanding lead in most areas of science and technology complicate the problem of evaluating current American R&D activities in relation to those of other countries. In many fields, other nations have allocated a major part of R&D funds for adaptation to their own commercial and strategic requirements of the fruits of past U.S. R&D efforts. Even where national defense considerations have prompted the U.S. to limit access of other nations to its advanced technology, scientists abroad have been able to duplicate U.S. results at a small fraction of the original cost.

Although the U.S. has also derived considerable benefits from imported scientific and technological knowledge, its relative position has meant that this source of advances could be of only secondary importance. However, as other industrialized nations are able to further narrow the technology gap, the U.S. will benefit accordingly. Furthermore, because labor costs in Europe and Japan are now approaching, and in some cases exceeding, those in the U.S., and because all industrialized nations are likely to face secularly rising prices for many raw materials in the future, innovations originating abroad will be of increasing interest to American Producers and consumers.

The United States is still spending more on research and development than the combined total for all other OECD countries. Nevertheless, critics argue that the U.S. is "falling behind," relative to recent efforts of other industrialized nations and to its own past performance. The National Science Board, in a recent evaluation of United States R&D activities, made a number of specific international comparisons, each of which sheds light on some

aspect of U.S. performance in relation to that of other nations.⁹ While each individual comparison has serious defects as a measure of U.S. technological effort and capability, a consistent overall picture can be obtained from available data.

(1) R&D as a fraction of GNP. For the United States, this proportion has been falling steadily since the late 1960s. In contrast, the fraction of GNP devoted to R&D has been rising in West Germany, Japan, and the U.S.S.R. Table 5 shows percentages for 1963 and 1973. (See Table A4 for other years.)

Table 5

R&D as a Percentage of GNP, 1963 and 1973

	1963	1973
U.S.	2.9	2.4
Canada	0.9	0.9
France	1.5	1.7
West Germany	1.4	2.4
United Kingdom	2.3	1.9
Japan	1.2	1.9
U.S.S.R.	2.2	3.1

Sources: Science Indicators, 1974, p. 154 (except Canada, U.K.); International Economic Report of the President, 1976, p. 119 (Canada, U.K.).

The downward trend for the U.S. continued in 1975, with R&D expenditures dropping to 2.3 per cent of GNP.

(2) Scientists and engineers. After 1969, the number of scientists and engineers engaged in R&D as a fraction of total population fell for the U.S. in response to sharp reductions in Federal support of basic science.¹⁰ Elsewhere this proportion continued to rise. However, the U.S. fraction remains higher than that of its major commercial competitors. Table 6 compares the U.S. with other major R&D-performing countries:

Table 6
Scientists and Engineers Engaged in R&D, 1963-1973
(per 10,000 population)

	1963	1964	1969	1971	1973
U.S.	-	24.7	27.5	25.6	24.9
U.S.S.R.	18.8	20.3	29.1	32.6	37.2
Japan	12.0	-	16.9	18.9	-
West Germany	-	5.7	12.5	14.9	17.8
France	6.7	-	10.9	11.1	-

Source: Science Indicators, 1976, p. 155.

(3) Defense spending. R&D allocated to national defense functions is likely to have a relatively minor impact on productivity growth and to produce fewer commercially viable innovations than R&D directed toward other objectives.¹¹ The fraction of government R&D devoted to national defense fell for all major R&D-performing countries between 1961 and the early 1970s. However, the United States allocated the largest fraction

of total R&D resources to national defense of any OECD nation.¹²
 Table 7 compares the U.S. with four major commercial competitors.
 (See Table 2 for more detail on the distribution of government R&D expenditures.)

Table 7

Percentage of Government R&D Allocated to
National Defense, 1961-1962 and 1971-1972

	1961-1962	1971-1972
U.S.	71	53
United Kingdom	65	44 ^a
France	44 ^b	28 ^c
West Germany	22 ^b	15 ^d
Japan	4	2 ^e

^a1972-1973 ^b1961 ^c1972 ^d1971 ^e1970-71

Source: Science Indicators, 1974, p. 156.

(4) Output of scientific literature. Publications in technical journals provide a rough index of research output, i.e., production of new knowledge. American researchers contributed the largest share of the scientific literature published in 1973 of any major R&D-performing country in all fields except chemistry and mathematics, where the U.S.S.R. had the highest share. While the relative and absolute position of the U.S. changed little in this respect between 1965 and 1973, there

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was some evidence of a slight decline in both 1972 and 1973 in the fields of chemistry, engineering, and physics, possibly a consequence of reduced funding for basic research in these areas.¹³

(5) Literature citations. Citation indices compare a nation's actual share of citations worldwide with its share of total publications in that field and thus provide a measure of the quality of research output. By this measure, the U.S. leads or is tied for first place in every field assessed, with the largest leads in physics and the earth and space sciences.¹⁴ Language of publication may play an important role in determining the frequency of citations. This appears to be the case for the U.S.S.R., which ranks last in five out of six fields. Nevertheless, Japan ranks just below the U.S. and U.K. in medicine, biology, and the earth and space sciences.

(6) Nobel Prizes. An award to scientists responsible for major advances in their field, the Nobel Prize is a measure of national research performance in the basic sciences. U.S. scientists have received a larger number of Nobel Prizes in the sciences than those of any other nation. The U.S. share fell, however, between 1951-1960 and 1961-1970 in all fields. Furthermore, when shares are adjusted for total population, the United States falls behind the United Kingdom for the decades since World War II.¹⁵

(7) Patent balance. Patent statistics provide a crude measure of "inventiveness." The number of foreign patents granted to U.S. individuals less the number of U.S. patents granted to foreign nationals, the U.S. "patent balance" was positive but declining between 1966 and 1973. This observed decline reflects at least in part an increase in the degree of

integration of the world economy, an explanation which is supported by corresponding declines in the patent balances of other nations.¹⁶ The U.S. has a positive balance with all countries except West Germany and the U.S.S.R.¹⁶ Patent statistics should be interpreted with care, since patented inventions vary considerably in their scientific and economic significance. Furthermore, some important innovations are not patented. Also, legal factors¹⁷ play an important role in determining patent practices and changes in them. Table 8 shows the patent balances of the U.S. with other R&D-performing nations.

Table 8

U.S. Patent Balance^a, 1966-1973

	1966	1970	1973
Worldwide	36,066	33,697	25,306
Canada	15,676	17,598	11,619
West Germany	-248	-1,552	-639
Japan	3,561	2,149	546
United Kingdom	11,440	9,776	8,866
Other E.E.C. Countries ^b	5,700	5,743	4,914
U.S.S.R.	-63	-17	-177

^a Foreign patents to U.S. nationals less U.S. patents to foreign nationals.

^b Excluding France.

Source: Science Indicators, 1974, Tables 1-10 and 1-11, p. 164.

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(8) Major innovations. A recent study¹⁸ of major innovations between 1953 and 1973 showed the U.S. to have originated a majority. However, the U.S. share fell from a high of 80 per cent in the late 1950s to 55-60 per cent toward the end of the period. The U.K. was second, followed by West Germany and Japan, both of which increased their shares between 1960 and 1973. Relative to its total number of innovations, the U.K. led the U.S. in the proportion classed as "major technical advance" or "radical breakthrough."¹⁹

(9) Sale of technical information. Receipts from sales of technology to other countries provide a measure of a nation's accumulated stock of useful knowledge. Purchases of technical information from other countries indicate the nation's ability to make use of such information. This in turn depends both on the relative advancement of domestic technology and the existence of the infrastructure required to adapt imported products and processes to local requirements. The U.S. had a positive and increasing balance of payments from the sale of patents, licenses, and manufacturing rights for the period 1960-73. Japan was a major purchaser of U.S. technology, a fact which may indicate Japan's relative sophistication in science. Table 9 shows the U.S. balance arising from sale of "know-how."

(10) Productivity. Gross Domestic Product (GDP) per employed civilian depends upon many aspects of economic structure, including the capital-labor ratio, state of technology, and labor skills. This measure of productivity remains higher in the U.S. than in other major R&D-performing countries, although other nations have experienced more rapid increases than the U.S.²⁰ See Table 10.

Table 9

U.S. Net Payments for Patents, Manufacturing Rights, Licenses, etc.
(million U.S. dollars)

	1960	1967	1974
Worldwide	210	289	601
Western Europe	105	97	200
Japan	48	91	241
Developing Nations	25	48	91
Other	31	54	69

Source: Science Indicators, 1974, p. 167.

Table 10

GDP per Employed Civilian

(U.S. = 100)

	1960	1967	1974
United States	100	100	100
France	55	63	81
West Germany	52	56	74
Japan	24	32	57
United Kingdom	51	49	56

Source: Science Indicators, 1974, p. 168.

(11) Balance of trade. The "product cycle" hypothesis identifies differences in technology across countries as a principal determinant of trading

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patterns. The U.S., with its technological lead in most areas, has experienced a consistently large and positive balance of trade in high technology products. A recent empirical study of the export performance of U.S. manufacturing industries concluded that up to three-quarters of total variation in industries' export performance is associated with differences in research intensity alone.²¹

U.S. performance in high technology industries appeared to weaken between 1968 and 1972, but the high technology surplus has been growing again since 1973.²² In contrast, the balance of trade for other manufactured goods

Table 11

U.S. Trade Balance for Selected Commodities, 1960-1975

(billions of dollars)

	1960	1964	1968	1972	1975
Aircraft and parts	1.0	0.8	2.0	2.5	5.7
Computers and parts	0.0	0.2	0.5	1.2	2.1
Other non-electric machinery	2.6	3.4	3.6	4.3	12.5
Basic chemicals and compounds	0.1	0.5	0.7	0.7	1.6
Motor vehicles and parts	0.6	1.1	-0.6	-3.5	-0.6
Steel products	0.2	-0.1	-1.4	-1.9	-1.7
Consumer electronics	-0.1	-0.2	-0.6	-1.7	-1.6
Textiles, clothing, and footwear	-0.4	-0.5	-1.5	-3.3	-3.0
All manufactures	6.2	8.0	4.5	-2.4	22.4

Source: International Economic Report of the President, 1976, Table 27, p. 151.

has been negative in recent years. Table 11 shows movements in the U.S. trade balance for selected commodities over the period from 1960 to 1975. While high technology industries generated increasingly large surpluses, trade deficits steadily grew in motor vehicles, steel, consumer electronics, and textiles, clothing, and footwear -- a trend reversed only after devaluation of the dollar. Following a large overall balance of trade surplus for 1975, U.S. trade performance again began to sag. Although the unprecedented recent deficits are partly a consequence of accelerated oil imports, a number of manufacturing industries also encountered renewed problems with competing imports; the Federal government has received urgent appeals for import relief from manufacturers of shoes, color television sets, and steel, among others.

The overall U.S. trade surplus for 1975 resulted from positive balances on trade with the European Community, the Communist Countries, and non-OPEC developing nations offsetting negative balances on trade with Japan and OPEC members. Table 12 shows these components.

Obviously, no single measure allows a meaningful assessment of the state of U.S. technological capabilities. In interpreting the statistics presented above, it is useful to keep in mind that some measures, such as the balance of payments on foreign sales of technological information or the index of scientific citations, depend upon the accumulated national stock of scientific and technical knowledge, while others, especially the proportion of GNP devoted to R&D, reflect current additions to that stock of knowledge. The United States' showing is most clearly superior to that of other nations in terms of measures which depend upon the accumulated stock and less strong in measures of current additions to that stock. Thus, the composite picture

Table 12

U.S. Balance of Trade, by Region, 1975
(billions of dollars, f.a.s.)

Region	Balance
Worldwide	11.1
Canada	0.0
European Community	6.3
Japan	-1.7
LDCs except OPEC	6.3
OPEC members	-6.3
Communist Countries	2.2

Source: International Economic Report of the President, 1976, Table 22, p. 149, and Tables 28-33, pp. 152-3.

which emerges shows the nation still pre-eminent in science and technology, but with its competitors closing the lead in some important respects.

Whether the relative gains of other nations should be a source of concern to the United States is subject to debate. First, it is the nation's absolute rather than its relative technological gains which are the primary long run determinant of its economic growth and welfare. Furthermore, in many cases the U.S. can also derive benefits from technological advances abroad as these become reflected in lower prices of imported goods. But rapid changes in international comparative advantage associated with technological advances abroad have posed a serious internal adjustment problem for the U.S. It is

the problem of adjustment to changed economic conditions, rather than foreign technological progress itself, which is likely to cause welfare losses at home. Larger R&D investments in the United States may mitigate problems of adjustment by delaying the time at which a particular industry begins to lose ground to its foreign competitors and in some cases may even allow the industry to remain competitive indefinitely. For this reason, R&D assistance may appropriately be regarded as a possible domestic policy tool for minimizing the private and social costs associated with adjustment to changed international competitive conditions.²³

III. R&D, Productivity Growth, and Competitiveness

Effects of R&D on Productivity

R&D is economic activity specifically designed to promote technological innovation. This effort may be directed toward any of the successive stages in the transformation of technical knowledge into a usable product or process. Systematic study of the relationship between R&D investments and resulting measurable outputs is complicated by the long and unpredictable lag between discovery of the basic scientific or technological information which makes an innovation possible and the large scale use of the resulting innovation. The length of this lag is determined by economic as well as technological factors. The feasibility of a new process may be of scientific but not of commercial importance at one set of input prices but highly profitable at other prices, as in the case of solar energy. Likewise, labor saving appliances will be of commercial interest only if an adequately large high wage market exists. However, the purely technological problems which must be surmounted in taking a product or process from the laboratory or workshop to the stage of mass production and distribution may in some instances be more difficult and time consuming than the initial discovery on which the innovation is based, as in the frequently cited case of penicillin.

Despite the formidable conceptual and empirical problems entailed in quantifying the contribution of R&D to economic growth and increased

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productivity, a large volume of studies has led economists to virtual agreement on two basic points:

(1) Improvements in technology have been a crucial determinant of economic growth in the United States and other industrialized countries.

(2) Investment in research ~~whether~~ ^{and, in some instances,} by the private sector ~~or~~ ^{as and sometimes} government, has had a rate of return ~~at least~~ ^{and in some cases} as high ~~and in some cases~~ far higher ~~than that for~~ other types of investment (physical capital, education).²⁴

Studies evaluating the economic contribution of improved technology fall into four categories, which take as their individual focus innovations, firms, industries, or the economy as a whole. Studies which calculate rates of return for significant individual innovations relate the value of new or improved products and processes to the full costs of innovation, including associated "dead-end" research. In this category are studies by Griliches for hybrid corn, Peterson for poultry research, and Weisbrod for polio vaccine. Their findings are summarized in Table 13. Studies of individual innovations

Table 13

Rates of Return for Individual Innovations²⁵

Study	Coverage	Internal Rate of Return (per cent)
Griliches (1958)	Hybrid corn	37
Peterson (1967)	Poultry breeding	33
Weisbrod (1971)	Polio vaccine	9-13

Source: Freeman (1977), p. 112-113.

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allow a precision in measuring direct benefits and costs which is not possible at a more aggregate level and thus provide considerable insight into the innovation process. However, their results cannot easily be generalized to predict relationships between R&D and aggregate economic growth, since unsuccessful innovations are not investigated.

An alternative approach, more likely to capture the cost of all R&D effort whether or not it yields some useful innovation, relates cumulated R&D expenditures to productivity growth in the individual firm performing the R&D. Results of four such studies are summarized in Table 14. These

Table 14
Rates of Return on R&D for Individual Firms

Study	Coverage	Perpetual Rate of Return (per cent)
Minasian (1969)	8 chemical firms	48-54
Mansfield (1965)	10 petroleum & chemical firms	40-60 (petroleum) 7-30 (chemical)
Baily (1972)	6 pharmaceutical firms	25-35*
Griliches (1978)	883 large firms	17

* Internal rate of return.

Source: Freeman (1977), p. 112-113.

results must be interpreted with caution, since R&D activities may have important spill-over effects on the productivity of other firms in the

industry. Furthermore, new or improved products or lower prices in one industry will raise productivity in other industries downstream, even if the latter engage in little R&D activity of their own.

A third group of studies links productivity growth across industries to cumulated investment in R&D. Results for four studies of this type are summarized in Table 15. Although this type of analysis does capture cross-firm productivity effects, it does not reveal productivity gains to one industry resulting from improved technology in another.

Table 15
Rates of Return on R&D for Manufacturing Industries

Study	Coverage	Perpetual Rate of Return (per cent)
Terleckyj (1960)	20 industries, 1919-1953	50
Mansfield (1968)	10 industries, 1946-1962	20-62
Griliches (1973)	85 industries, 1958-1963	40
Terleckyj (1974)	20 industries, 1948-1966	30% (own private) 0 (government funded)

Source: Freeman (1977), pp. 112-113, and Terleckyj (1974), p. 42.

In the three types of studies described above, R&D effort enters explicitly into the analysis. A fourth approach, usually used to investigate economic growth at the aggregate level, is the "residual" or "growth accounting" method. Growth in aggregate output is related to the growth of factor

inputs; that part of output growth not accounted for by growth in factor inputs is labeled "productivity increase."

Work in this area has concentrated on development of more satisfactory output and input measures. An early study by Robert Solow (1957) found that growth in capital and labor accounted for only about 13 per cent of U.S. growth over the period 1909-1949. This left a staggering 87 per cent of growth to be explained by "technical change," that is, shifts in the production function relating inputs and outputs. Of course, the residual of unexplained output increase captured many effects omitted from Solow's analysis. Apart from improved technology, the residual could be due in part to economies of scale, improved managerial techniques, favorable changes in the social and political environment, and so on. Probably more important, the residual also reflects deficiencies in the measurement of inputs.

The first refinements in the measure of inputs concentrated on labor skills. Over the period analyzed by Solow, the American labor force changed in "quality" as a result of increased education. A study by Denison (1962), in which labor inputs were adjusted for increased quality, reduced growth of outputs unexplained by growth of inputs to only a third of the total. Later work by Griliches and Jorgenson (1967) also adjusted capital inputs for improved quality and yielded a still smaller residual.²⁶

A recent study by Christensen, Cummings, and Jorgenson (1978) has compared the sources of post-World War II economic growth for nine countries. For the period 1960-1973 the highest output growth rates, for Japan (10.9 per cent) and Korea (9.8 per cent), are associated with the highest growth rates of real capital input (11.5 and 7.3 per cent, respectively) as well as

of total factor productivity (4.5 and 4.0 per cent). Korea also had the highest growth rate of real labor input (5.0 per cent), with both hours worked and quality of hours worked increasing rapidly in comparison with other nations.

The growth accounting framework yields no satisfactory measure of the value of R&D in stimulating economic growth. As mentioned earlier, the residual may capture numerous influences apart from improved technology. Furthermore, even that part of the residual which is attributable to advances in technical knowledge need not reflect results of R&D. Denison has estimated that only about one-fifth of U.S. aggregate productivity improvement is the result of organized research activities in the U.S.²⁷ For countries with smaller R&D investments, the figure is probably still lower. On the other hand, the growth accounting framework "credits" to real factor growth what may be the ultimate consequences of increased technological knowledge attributable to R&D. Investments in physical and human capital depend upon rates of return, and improved technology probably stimulates both types of investments. Any advance in knowledge which is useful only when "embodied" in improved capital goods will show up in the growth accounts as the contribution of input growth rather than increased factor productivity.

The relationship of aggregate R&D effort to aggregate economic growth is further complicated by the heterogeneity of research effort. Expenditures for development can be expected to have a more immediate impact on economic growth than those in support of basic research. Furthermore, the gains from the latter are likely to be readily available to other nations. Also, R&D expenditures related to defense and space, a large fraction of total government supported R&D in the U.S., may have little or no effect on productivity growth.

R&D as a Determinant of Trade

Previous sections have reviewed empirical evidence on the relationship between U.S. R&D and productivity growth and on the continuing strength of U.S. trade performance in the high-technology sectors of manufacturing. This section examines channels through which R&D may influence the international competitiveness of U.S. products.

The ability of a U.S. firm to export its products depends upon the combined impact of many economic considerations:

- (1) dollar costs of labor, capital, and other inputs,
- (2) factor productivity,
- (3) exchange rates, tariffs, and quotas,
- (4) terms of delivery, insurance, credit, etc.,
- (5) product characteristics,
- (6) seller reputation, service facilities, etc.

The first four items listed together determine delivered cost in terms of foreign currency of the product. However, these considerations are not independent. More productive labor and capital command a higher market price. Conversely, high factor costs may provide an incentive for undertaking R&D projects designed to cut costs. High dollar costs due to inflation at home are likely to force the dollar down in value relative to other currencies. A government reluctant to allow its currency to depreciate may instead subsidize credit for foreign purchasers.

Delivered cost is only one dimension of competitiveness. The fifth and sixth considerations listed are sources of differentiation of the product from its potential competitors, features which may compensate for

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a relatively high delivered cost. Of course, even when a product is truly unique, delivered cost will enter into its export performance by determining total world demand. Also, high production costs or trade barriers induce some U.S. firms to set up production facilities abroad rather than serving foreign markets through exports only.

Cost Competitiveness. The U.S. has been a "high wage" economy for many years. However, as Table 16 indicates, wages in other industrial countries are rising rapidly. Average labor costs in Canada and Sweden now exceed those in the U.S., and West German wages are now close to U.S. levels. It should be noted that changes shown reflect both rises in local money compensation and exchange rate realignments. Also, these aggregate statistics make no correction for differences in levels of skills, education, or experience.

Table 16

Hourly Compensation of Production Workers in Manufacturing, 1960-1976

(U.S. dollars)

	1960	1970	1975	1976
U.S.	2.66	4.20	6.33	6.90
Canada	2.13	3.46	6.24	7.39
France	0.83	1.74	4.50	4.59
Italy	0.63	1.75	4.44	4.27
Japan	0.26	0.99	3.05	3.26
Sweden	1.20	2.96	7.36	8.50
United Kingdom	0.82	1.46	3.26	3.05
West Germany	0.83	2.32	6.33	6.70

Note: 1975 figures are mid-year; 1976 figures are mid-year estimates; no adjustments have been made for the value of fringe benefits.

Source: International Economic Report of the President, 1977, p. 99.

International wage differences are far from uniform across industries. As Table 17 indicates, the U.S. has the highest wages of any country in primary metals and motor vehicles. However, it is not labor cost per hour but labor cost per unit of output which is relevant in determining international competitiveness. From 1960 to 1976, productivity (output per hour) rose more slowly in the U.S. than in other industrialized countries, perhaps a reflection of the high level already reached at the beginning of the period. But U.S. wages also rose more slowly than elsewhere, so that unit labor costs grew less rapidly in the U.S. than in Canada, Europe, or Japan.

As long as productivity gains are not fully reflected in higher wages, additional R&D could increase the cost-competitiveness of some U.S. manufactures in dollar terms. However, it is important to recognize that the very success of such a strategy is likely to induce changes throughout the economy which reduce cost competitiveness of other industries through increased factor costs and exchange rate appreciation. This process is discussed in greater detail below.

For at least some low-skill industries, the U.S. cost disadvantage may be too great to be overcome through feasible R&D-induced productivity improvements. As Table 17 shows, wage rates in textiles, footwear, and apparel are relatively low in all the industrial countries. However, labor costs are far lower still in those less developed nations such as Taiwan, Hong Kong, and Brazil, which have gained a rapidly increasing share of the world market for these products, despite formidable barriers to trade.

Table 17

Hourly Compensation of Production Workers by Selected Industry, 1976^a

	(U.S. dollars)							
	Textiles	Footwear	Apparel	Chemicals and Chemical Products	Primary Metals	Electrical Equipment	Non- Electrical Machinery	Motor Vehicles
U.S.	4.55	4.10	4.15	7.80	9.95	6.50	7.55	10.75
Canada	5.30	4.55	4.60	7.75	8.90	6.75	8.30	9.35
France	3.80	3.60	3.35	5.50	5.60	4.40	4.90	4.80
Italy	3.50	3.20	2.75	5.05	5.60	4.55	4.60	5.10
Japan	2.35	2.25	1.70	4.65	4.85	3.00	3.70	3.85
Sweden	7.60	7.25	6.95	8.30	9.40	7.85	8.35	8.80
United Kingdom	2.60	2.70	1.90	3.50	3.70	2.90	3.15	3.65
West Germany	5.50	4.80	4.95	7.60	7.30	6.25	7.05	8.60

^a Mid-year estimates.Source: International Economic Report of the President, 1977, pp. 100-101.

Product competitiveness. Some U.S. products, usually new products and often from the high technology industries, have no close competitors in foreign markets. The United States, with its giant (in absolute terms) research establishment and abundant supply (both in absolute and relative terms) of skilled labor, scientists, and engineers, has enjoyed a temporary world monopoly position for many unique products, only to have that advantage eroded through imitation or diffusion of the required technology.

Until the 1950s economists took for granted that the United States, clearly a capital-abundant economy, had a comparative advantage in the production of capital-intensive goods -- as predicted by the well-accepted factor proportions theory of trade flow determination.³⁰ The finding by Leontief (1954) that U.S. imports are more capital-intensive than its exports stimulated a wave of new theoretical and empirical investigations into the determinants world trade flows. These studies highlighted the roles played by skills or "human capital" on one hand and R&D on the other; in empirical investigations these considerations are difficult to separate, since the industries with high R&D intensity (a high ratio of R&D expenditures to total sales) are also ones with a high proportion of skilled workers.³¹ Work by Keesing (1966,1967) and others confirmed that the U.S. export performance was strongest in industries employing high proportions of skilled workers. Thus, the factor-proportions theory could be reinterpreted as predicting that the skilled-labor-abundant U.S. has its comparative advantage in the production of skilled-labor-intensive products.

A related response to the Leontief "paradox" came in the dynamic trade product cycle theory, which interpreted much of U.S. trade as reflecting the

first stage of the adjustment process following a successful innovation. According to the product cycle theory, as described by Vernon (1966) and others, a new product actually changes in its characteristics over time, becoming increasingly standardized and thus amenable to production by relatively less skilled workers. In the early stages of commercial exploitation, rapid interaction between market and producer is advantageous as alternative product characteristics are being explored; reliability is often low, so that access to service facilities may be crucial; the initial innovation and production process is likely to require considerable inputs of skilled labor. As standardization proceeds and the market for a new product expands in response to falling price, the need for skilled labor is greatly reduced and cost competitiveness begins to exert a decisive influence on location decision. This will be particularly true when an innovation has been emulated successfully by other producers. The product cycle hypothesis has been well documented for many new products including synthetic fibers, drugs, and consumer electronics. Nevertheless, the product cycle is more a suggestive scenario than a complete theory, since it does not predict the length of successive phases in the cycle.

Because the innovating country gradually loses its competitiveness for a given product as the cycle proceeds, some attention has been given to measures which would slow down the cycle, delaying the shift of production to lower cost locations. Among measures suggested are legal restraints on the rights of innovating firms to exploit their unique technology through direct foreign investment or licensing of foreign production. For example, the Burke-Hartke bill, endorsed by the AFL-CIO, would have allowed the

President to prohibit the holder of a U.S. patent from manufacturing the product abroad or licensing foreign production if, in his judgment, this prohibition would contribute to increased employment in the United States. The effects of implementing such measures could, however, be very different from those intended. Most U.S. firms characterize their foreign investments as defensive, arguing that the markets served would otherwise be lost to European or Japanese firms taking advantage of favorable cost conditions abroad. Furthermore, the proposals tend to overlook the dynamic character of the product cycle. Although it would perhaps be possible to delay the shift abroad of production of particular goods, such restraints lower the profitability of innovative activity. This in turn could reduce future investments in R&D, diminishing the flow of new products with which the cycle commences. Thus measures which stimulate the innovation process, rather than retarding the diffusion process, are more likely to yield long run benefits.

General Equilibrium Effects of Expanded R&D

The previous section details ways in which R&D contributes to an industry's international cost or product competitiveness. However, each industry is connected to the rest of the economy in a number of ways. Factor and product market linkages are one important source of interaction. The behavior of exchange rates and endogenous elements of U.S. and foreign commercial policy is another. The technologically-based advantage of affected firms will show up in the form of increased foreign sales and possibly also as decreased penetration of the domestic market by imports. These are, however, sectoral effects. The effects of expanded R&D for the welfare of the nation in general and for the structure of U.S. trade in particular must be viewed in terms of the total rather than the partial effect, taking into account important spill-over effects which influence the costs, growth rates, and international competitiveness of other industries. These interconnections are illustrated in Figure 1.

A first major interindustry effect comes in the form of superior inputs available to industries which buy from those developing new or improved products. Improved products sold by one industry can show up as cost reductions for others, with superior intermediate goods and capital goods making production of existing products less expensive and sometimes also facilitating development of further new products. Thus, successful innovation can induce a secondary wave of benefits in downstream industries.

A second source of interaction comes about because all U.S. industries are tapping an interconnected market for productive factors. Even if incentives provided are not specific to particular sectors of the economy, differences

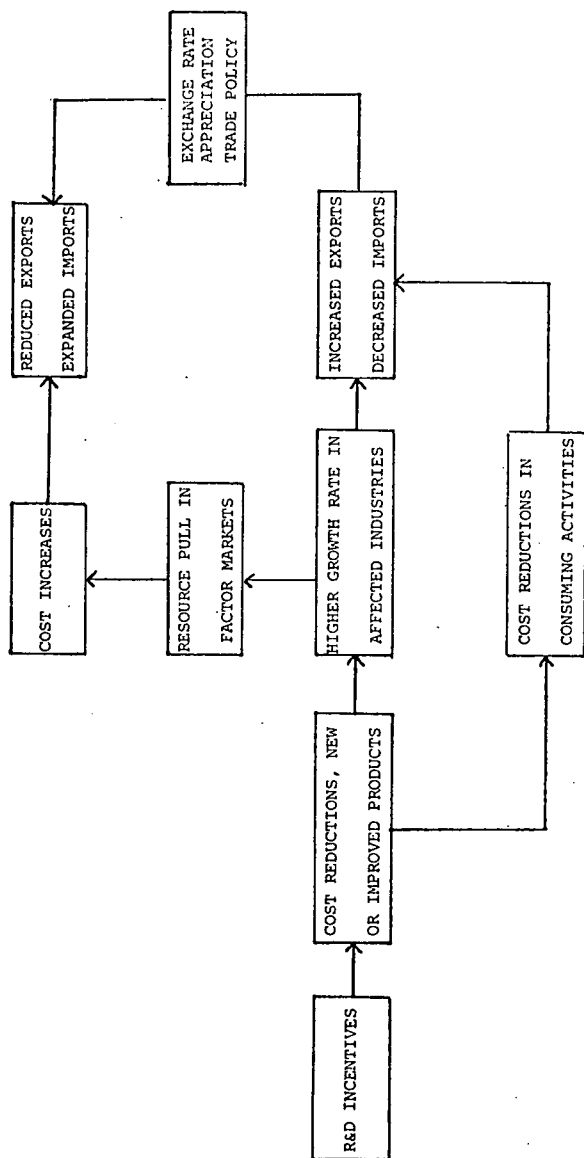


Figure 1

Direct and Indirect Consequences of Policies to Promote R&D

in the profitability of making R&D investments are likely to imply that more activity will be generated in relatively "new" industries where the rate of return on such activity at the margin has not yet been forced down by past innovation and imitation. Thus, the high-technology industries will probably have the largest induced responses. The innovating industries will be induced to expand as profitable new products and processes are generated. New products and lower (quality adjusted) costs will allow these industries to increase their market shares, both domestically and abroad. The necessary expansion of these industries will draw capital and labor out of other parts of the economy and may also lead to an expansion of overall employment. Mobile factors drawn into the expanding industries will tend to receive higher financial rewards, as a bonus to their willingness to relocate, either geographically, by industry, or in terms of new skills required. In the U.S., the high-technology industries have grown about twice as fast as the low-technology industries and have created new jobs about five times as fast.³²

As the technologically progressive industries expand, drawing in capital and labor, the prices of some productive factors will rise, resulting in higher costs for other industries requiring these inputs. This pull creates a natural and desirable incentive for stagnant sectors of the economy to contract, but may also cause some dislocations as declining industries become unable to compete in international markets. Older industries with slower growth rates are likely to suffer from the exit of capital, entrepreneurial talent, younger and more skilled workers, as these resources are drawn into the more profitable expanding new sectors.³³

A third spillover comes through balance of trade and exchange rate consequences of successful innovation. With a flexible rate system, the expansion of exports by the technologically progressive sectors will induce an exchange rate appreciation. This makes other sectors of the economy less cost competitive even if they have been unaffected by factor market spillovers. When exchange rates are fixed or "managed," improved trade performance in some sectors may influence overall commercial policy by weakening the case for protectionist or mercantilist options. Thus, vigorous trade performance by some sectors may lead to a more liberal trade stance and less likelihood that broad-based balance of trade measures such as import deposit requirements, import surtaxes, or disguised export inducements will be adopted or retained. While this is highly desirable for the economy as a whole, it may exacerbate the already considerable adjustment problems of stagnant industries.

IV. Government Policy Toward R&D

The Need for Government Action to Promote R&D

Promotion of R&D has come to be recognized as a legitimate and important function of the Federal Government. About \$23.5 billion was allocated for support of R&D activities during the 1977 fiscal year, around 5 per cent of the total Federal Budget. However, these figures underestimate the total level of resources channeled to R&D activities by the Federal Government, since they do not include the indirect costs (including foregone Federal revenues) of policies intended to encourage innovative activity, such as accelerated depreciation of new equipment.

Federal support for R&D can be justified in one of three ways, not mutually exclusive. First, the lion's share of Federally supported R&D is in areas of public sector functions, particularly national defense and space. (See Table 2.) Since the Government is the major and often only purchaser of the outputs of these sectors of the economy, it must also undertake the support of research and development aimed at producing improvements in these areas.³⁴ Civilian "spin-offs" from defense and space R&D programs reduce their net cost to the nation; however, spin-offs do not in themselves constitute an economic justification of the programs, as the same level of resources directed toward civilian objectives would yield a higher level of civilian benefits.³⁵

A second justification for Federal R&D support applies in particular to basic science research and to a lesser extent to applied research and development activities. Most advances in basic knowledge have little or no immediate market value, as they are useful mainly in the production of further knowledge rather than saleable goods and services. Also, new knowledge is a "public

good" in the sense that it cannot be used up and therefore yields the greatest social benefits when made freely available to all potential users. Private innovators will not have the incentive to produce as much new knowledge as is desirable from the national (or world) point of view; furthermore, benefits to private innovators rely mainly on maintaining exclusive access to the newly created knowledge, rather than making it freely available to potential users. For these reasons, direct government support of basic science research is generally acknowledged to be necessary and desirable. However, the political process in the U.S. is such as to make funds more readily available for project-oriented than for basic research. Thus, much fundamental biological and medical research is now supported under funds allocated for the "War on Cancer."

In the case of applied research and development in the civilian sector, resulting innovation typically has direct commercial usefulness. In this case, there is a trade-off between the static benefits from making any given knowledge freely available to all potential users and the dynamic benefits from insuring a steady flow of new innovations by allowing the innovator to exploit commercially the benefits from exclusive access. The patent systems in use in the United States and other countries represent a practical compromise between these considerations for those types of commercially useful knowledge which are subject to control through patents. However, the total social gains from innovation of this type may still far exceed the benefits which can be captured through commercial exploitation. This may be true because of spillover effects, as when the new or improved products of one industry lower costs in another, or because innovation is highly risky and requires immense capital outlays long in advance of expected benefits, as in the area of energy. To the extent that social benefits from innovation generally exceed private

benefits, so that the private sector will systematically under-invest in applied research and development, there is a case for government policies which raise the overall private return through measures such as favorable tax treatment or subsidies. These measures would be relatively neutral with respect to different industries and types of innovation,³⁶ but would raise the average return to innovative activity of all types, thus leaving to individual firms the choice of areas deemed most promising. However, if particular areas such as energy research and development are considered to have especially high risk or prohibitive capital requirements, there may be a case for special measures to raise the private return to innovation in these industries relative to the average rate for all industries.

A number of industrialized countries have provided R&D incentives specifically designed to establish or maintain "international competitiveness" of particular industries or of manufacturing as a whole. While this has not been an explicit policy in the U.S., it has been a frequent justification offered in support of individual proposals and of R&D incentives generally. In this connection, two issues should be raised. First, as with any investment decision, the case for R&D requires not merely evidence of a positive effect but of a (social) rate of return higher than that for alternative uses of the resources. Second, as discussed earlier, R&D incentives which improve the competitiveness of some sectors may have indirect consequences which lead to a deterioration of the trade position of other industries.

R&D aimed at public sector functions or basic science presents a special problem of resource allocation which arises to a much smaller degree in promotion of commercially useful innovation. In the latter, market demand provides

a guide to resource allocation. In the former, it is far more difficult to attach dollar values to expected outcomes of alternative allocations; appropriate allowances for risk and for comparison of present and future benefits may be highly subjective. Allocation of R&D support for public sector functions relies upon a largely bureaucratic decision-making process with important inputs from the potential users of innovations. Many Department of Defense contractors also initiate their own R&D activities to develop new products or processes geared to perceived future public sector requirements. The treatment of costs incurred for such contractor-initiated R&D is a present area of contention.³⁷

In basic science research, most funds are allocated by a "peer review" process. This has the advantage of engaging the judgment of those likely to be most knowledgeable in any given field, but may also systematically discriminate against heterodox approaches. Another frequent criticism of current practice is that awards depend upon the professional reputation of the principal investigator -- based mainly on past research performance -- as much as the scientific merit of the proposed work. While this procedure has the virtue of introducing important additional information into the decision process, it may reinforce the position of established scientists rather than encouraging the work of innovative but less well known researchers. A study recently undertaken by the National Academy of Science seeks to review past research support decisions made by the National Science Foundation to determine the extent to which the principal investigator's identity affects evaluation of proposed research.³⁸

The Policy Spectrum

Government policies exert a profound influence upon the level and effectiveness of R&D activity. Some government measures are specifically intended to stimulate innovation. Many more are concerned with other aspects of national economic performance but nonetheless have an important effect -- positive or negative -- on innovative activity, almost certainly greater in the aggregate than that of policies bearing specifically on R&D. In assessing the policy spectrum available for influencing R&D, this section examines not only those measures intended to encourage R&D, but also those policies affecting R&D which have other underlying objectives. Each channel of influence has its distinctive advantages and drawbacks. The more direct the means of encouraging R&D, the more control the government can exercise over the nature of the work undertaken.³⁹ However, the more direct the stimulus, the smaller the role left to be played by market-generated incentives to maximize the economic returns from innovative activity, through choice of the most promising prospects and through control of costs. When policies are geared to objectives other than influencing R&D, it may be difficult or impossible to tailor provisions in such a way as to increase positive incentives to innovation or to mitigate the effects of negative ones.

Below, government actions which affect R&D are classified under five headings which distinguish among policies by the degree of support provided and the extent to which the effect on R&D is a primary motivation.⁴⁰ This classification indicates the very broad range of government policies which can be expected to influence national R&D activity.

Direct performance. This category, which accounts for about 15 per cent. of U.S. R&D, includes all those projects directly undertaken by government agencies in government-controlled facilities.

Direct support. A number of policies provide full or partial funding of research carried out in universities or other non-profit facilities and in industry. About 35 per cent of R&D funding in the United States comes in this form. Possible forms of direct support include: subsidies, joint government-industry ventures, special loan funds to finance innovations and their commercial application, and government procurement policies.

Primary incentives. These are policies whose primary purpose is to affect the incentives for innovative activity but which entail no direct budgetary allocation of funds. Special tax treatment of R&D (including accelerated depreciation of capital equipment embodying new technology) is one major incentive program of this type.⁴¹ Also included is national policy regarding the terms and lifetime of patent rights and government support of the education of scientists and engineers through grants to universities and fellowship programs.

Secondary incentives. Many policies affect the cost of or returns to innovative activity although this is not their immediate object. Of recent concern are policies to control foreign direct investment and technology transfer; although maintenance of employment and wages in import-impacted industries provides the primary motivation for action of this type, the implied restrictions on the economic usefulness of new technological knowledge lower the expected returns to firms engaging in innovative activity. Similarly, strict health and safety standards for new products, while intended primarily to protect consumers from product hazards, raise

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the cost of commercial introduction of new products and hence lower the expected returns from innovation.⁴² Likewise, massive R&D efforts in the areas of defense and space have probably raised R&D costs to other industries through their impact on the salaries of scientists and engineers.⁴³

Incidental incentives. Policies intended to improve the overall efficiency of the market mechanism through government regulation of economic activity may have indirect and sometimes unintended effects on incentives for innovation. Rate of return and price regulation of public utilities affects the return to innovation and to adoption of new technology as it becomes available. Likewise, where significant economies of scale exist in R&D or in the commercial adoption of new products and processes, successful antitrust action may lower the profitability of innovation if it reduces the size of firms in a given industry.⁴⁴ Of course, in neither case does the existence of negative incidental incentives necessarily argue against retention of present policies. However, it is essential that government agencies charged with implementing these policies be fully aware of such possible effects. (Although they are not directly the consequence of government action, union work rules delaying the introduction of new techniques or equipment are also likely to reduce incentives for innovation.)

Government regulation may also provide positive incentives for innovation. In recent years, pollution and automobile safety regulations have been responsible for greatly increased industry-initiated R&D in these areas. A recent study of industrial innovation in Europe and Japan⁴⁵ found that government regulatory restraints were frequently associated with successful innovations. Minimum wage laws (or effective action by unions to raise wages)

are likely to increase the profitability of labor-saving inventions. Price support programs for agricultural products or natural resources increase the profitability of developing synthetic substitutes. However, it should be emphasized that even if a particular policy results in increased R&D activity, it need not be beneficial to the economy as a whole.

Secondary and incidental incentives may be of great interest in assessing current prospects for increasing the level of R&D undertaken in the private sector. The adverse consequences for innovative activity of policies whose primary objective lies in other areas are often of great weight in determining the overall structure of incentives facing industrial innovators. At a time of public disillusionment with federally funded research, it may be difficult or impossible to increase budgetary allocations required for expansion of government performance or direct support. Likewise, additional tax incentives may be hard to implement. Changes in indirect incentives, especially those which now work to lower the returns to innovative activity in the private sector, may offer an important and often unrecognized option for promoting an expansion of R&D in the United States.

R&D Programs of U.S. Trading Partners

Most industrialized nations have adopted programs intended to promote R&D as a means of increasing competitiveness in world markets. These programs may operate directly, by generating commercially viable innovations and stimulating their diffusion, or indirectly, by strengthening the nation's overall technological capabilities. In addition to competitiveness in international trade, national prestige and defense considerations provide further motivation for adoption of policies to stimulate R&D. Table 18 reviews programs and tax incentives in use by major U.S. trading partners.

The actual impact of government policies to promote R&D depends critically on the general environment in which economic activity is conducted. Specifically, the overall state of technological advancement of the economy, market structure, and other governmental regulatory behavior all may be expected to play key roles in determining the outcome of a specific policy measure. A major study of foreign experience recently completed by the M.I.T. Center for Policy Alternatives⁴⁶ under a grant from the National Science Foundation has provided some important evidence concerning government influence on innovation. The M.I.T. study sought to identify country-specific and industry-specific factors influencing the process of innovation in five countries -- France, Germany, Netherlands, United Kingdom, and Japan -- and five industries -- computers, consumer electronics, textiles, industrial chemicals, and automobiles. Information from 59 firms supplied researchers with a total sample of 164 cases of industrial innovation. On the basis of interviews with managers, 66 cases were judged successful by the companies' own criteria and 51 as unsuccessful; 47 were still in progress.

Table 18

Government Research and Development Programs of U.S. Trading Partners

	Programs	Tax treatment
WEST GERMANY	No elaborate plan for stimulating industrial R&D though government supports various scientific organizations.	Tax allowances for R&D expenses incurred by corporations and individual inventors.
UNITED KINGDOM	Preproduction order support program to accelerate the use of technologically advanced capital goods (machine tools) in industry. Financial support for R&D in industry program for further application of technology in small firms and research associations. Launching aid program provides interest-free loans for development of civilian aircraft and engines. National Research Development Corporation, a public corporation, develops and exploits inventions from publicly financed research.	No special tax treatment.
FRANCE	Concerted actions program combines the efforts of universities and government laboratories for basic research on projects for industry. Aid to development program provides subsidies for development of new products for export or for import substitution. Letter of agreement guarantees the difference between actual sales and breakeven point, if sales are lower, to companies developing high priority R&D projects.	R&D expenses deductible up to total technical research profits. Accelerated depreciation on the first 50 percent of cost of R&D facilities.
JAPAN	Japanese Research Development Corp., a quasi-public corporation, provides 60 to 80 percent of development costs for high-risk R&D products with good potential for industrial use. National R&D program fully subsidizes high priority national projects to develop new technologies. Joint government/private sector projects in atomic energy, space, and ocean development areas.	Accelerated depreciation on the first third of acquisition cost of capital goods related to use of new technology. 25 percent deduction on R&D expenses.
CANADA	Program to enhance productivity provides up to 50 percent of feasibility study costs to determine whether new technologies can improve productivity. National Research Council, a public corporation, does basic research on R&D projects for industrial use. R&D consortia in private sector encouraged in the interest of spreading risk, pooling resources, and avoiding duplication.	Industrial Research and Development Incentives Act (IRDIA) designed to relieve industry of some of the financial burden of R&D effort. Provides up to 25 percent of capital expenditures for R&D. IRDIA grants nontaxable.

Source: International Economic Report of the President, 1975, pp. 106-07.

According to the managers, government involvement was present in almost half of the projects. The most frequent forms of influence were R&D cost reduction, environmental or safety regulation, and policies to facilitate access by firms to new technology. Government involvement was most frequently perceived by managers as a negative rather than a positive influence on project performance.

Except in the case of environmental and safety regulations, the rate of project success did not appear to depend upon government involvement. However, if firms have correctly assessed the probability of success prior to embarking on a project, those undertaken without (positive) government involvement would be expected to have a higher success rate. Thus, government influence may in fact raise the probability of success for projects which would not otherwise have been undertaken.

A surprising finding of the study is that environmental and safety regulations, perceived by managers as a negative influence on the innovation process, operated far more frequently in successful than in unsuccessful projects. Two possible explanations of this phenomenon may be offered. Regulatory requirements are set with existing technological capabilities in mind. Furthermore, innovative activity stimulated by these regulations is likely to produce suitably modified versions of products or processes with previously established market value.

Important cross-industry and cross-country differences in patterns of perceived government involvement were evident in the sample. While R&D funding was the prevalent form of action in computers and electronics, technical assistance was most important in textiles, and the negative effects

of environmental and safety regulations most significant for chemicals and automobiles. It is interesting that although four of the countries had measures explicitly designed to encourage development of the computer industry, government's perceived impact was slight in three and negative in the fourth (U.K.).⁴⁷ Across countries, German policies appeared to affect mainly the earliest stages of product development, while the role of government at late stages in the innovation process seemed most important for the U.K. firms. Although government involvement appeared to be greatest in France and least in the Netherlands, the difference was not statistically significant.

Because the total number of cases studied is small, the results of the M.I.T. study should be interpreted with caution. However, the study appears to confirm the importance of the "secondary" and "incidental" incentives affecting R&D discussed above. As Allen, et al. (1977) note in their discussion of the findings, the most striking aspect is the failure to identify any systematic influence of government support on project performance. The observed gap between intended and actual effects of government action underscores the difficulty of tailoring national R&D programs to the achievement of specific policy objectives.

U.S. Technology Enhancement Programs

The U.S. has done less than its major trading partners to encourage R&D in the private sector, perhaps because just a decade ago, the "technology gap" between the U.S. and the rest of the industrialized world was still viewed by some as a permanent feature of the international economy. However, the rapidity with which the gap narrowed alarmed many Americans, and in recent years new Federal programs have been established to promote R&D in various ways. These programs are described briefly below.

National R&D Assessment Program. This program, established in 1972 to study the role of science and technology in the U.S. economy, operates within the Directorate of Scientific, Technological, and International Affairs of the National Science Foundation. Work conducted under the program is intended to guide policymakers by identifying policy issues and clarifying the consequences of alternative options. Policy studies are carried out both by professional staff within the NSF and by university-affiliated researchers.⁴⁸

Experimental Research and Development Incentives Program. Another NSF program, its main objective is to develop, on an experimental basis, measures to reduce barriers to innovation. Among the experiments carried out have been making Federal laboratory facilities available to public contractors for performance validation, making university research capabilities available to industries currently performing little R&D, and establishing community programs to develop entrepreneurial ability.⁴⁹

Experimental Technology Incentives Program. This program, within the National Bureau of Standards, was created "to find ways to stimulate R&D

and the application of R&D results." ETIP focuses upon government procurement and regulatory policies as tools for promoting innovation to increase productivity growth in public sector functions.⁵⁰

Technical Assistance to Import-Injured Industries. The Trade Act of 1974 provides for trade adjustment assistance to firms injured by increased imports. Under the program, loans, loan guarantees, and technical assistance are made available to import-impacted firms, thus reducing the cost to firms of adopting newer technologies. A U.S. Commerce Department program to aid U.S. shoe manufacturers in modernizing their operations was instituted in 1977. If the program succeeds in helping U.S. shoe producers to become more competitive, a similar approach is likely to be extended to other U.S. industries injured by imports.

International Comparisons⁵¹

Table A4 compares government-funded R&D as a share of GNP for countries with major R&D programs. Of the group with high levels of absolute resources devoted to R&D (U.S., U.K., West Germany, France, Japan), the U.S. has the highest proportion of government-funded R&D. Japan is distinguished by its very low share of government funding. However, this by no means implies a small governmental role in promoting technological progress. Rather, it reflects the close cooperation between government and industry characteristic of the Japanese economy.

Table 18 shows shares of total government-funded R&D by function. The U.S. defense share, 52.6 per cent in 1971-2, dwarfs other U.S. programs as well as the defense R&D efforts of the other nations. France and the U.K. have followed the U.S. lead in this respect, with large fractions of total government R&D support allocated to national defense. It is notable that neither Japan nor Germany -- the two nations most frequently cited for the rapid advance of their technological capabilities -- has had the "benefits" of defense R&D spinoffs. Another noteworthy similarity between these two nations is the large share of total government support which goes to university general research funds.

National technological capability may be defined in terms of two overlapping functions: creation of new technology and adaptation and diffusion of new technology.⁵² During the 1950s and 1960s, a major focus of European and Japanese R&D was the importation and application of innovations originating mainly in the United States -- an emphasis endorsed by U.S. policymakers for strategic reasons. In Europe, much of the imported technology came in the form of direct investment by American firms. Japan, however,

Table 18

Percentage Distribution of Government R&D Support by Function

	U.S. 1971-72	Canada 1972-73	France 1972	U.K. 1972-73	W. Germany 1971	Japan 1969-70
<u>National Security & Big Science</u>						
Defense	52.6	8.6	27.8	42.8	15.0	2.2
Civil space	18.1	1.5	6.7	1.9	6.6	0.7
Civil nuclear	5.1	13.8	14.6	8.9	15.6	7.5
<u>Economic development</u>						
Agriculture, forestry, fishing	2.0	18.6	3.5	4.8	2.1	14.0
Mining, manufactures	3.7	29.5	13.3	16.1	10.6	7.0
Economic services	2.3	5.4	3.3	2.3	0.8	2.2
<u>Community Services</u>						
Health	8.5	10.8	1.8	5.0	2.5	1.8
Pollution	0.9	1.9	-	-	0.4	-
Public welfare	2.4	-	0.7	0.3	-	1.7
Other community services	1.2	0.8	0.8	0.8	1.3	0.7
<u>Advancement of Science</u>						
Advancement of research	2.9	7.6	14.6	5.8	7.6	0.2
University (general funds)	-	-	10.9	9.7	32.9	61.2
<u>Other</u>						
Developing countries	0.2	1.1	1.6	0.5	4.6	-
Miscellaneous	0.0	0.3	0.2	1.1	-	0.8

Details may not sum to 100% due to rounding.

Source: OECD, Changing Priorities for Government R&D, Paris, 1975, pp. 309-322.

discouraged direct investment; licensing served as the major vehicle for technology transfers.

Recent patent statistics suggest that Europe and Japan may have gained considerable ground in the capacity to create new technology as well as adapting innovations of foreign origin. The share of U.S. patents granted to foreign residents has doubled in the last 15 years (to 35 per cent in 1975) -- with Germany and Japan accounting for the largest numbers. However, these shifts may to some extent merely reflect increasing international economic integration over the period.

V. Conclusions

Previous sections have analyzed a number of aspects of R&D activity and its relation to innovation, productivity growth, and international competitiveness. Because the basic determinants of innovative success are still open to question, the available evidence cannot be used to support strong specific recommendations for new U.S. programs. However, a number of important conclusions and general recommendations emerge from the data and analysis:

(1) In absolute terms, total U.S. R&D expenditures continue to dwarf those of other nations and indeed of all other OECD nations combined. However, the allocation of R&D effort across nations differs markedly. Germany and Japan, the nations which have made the most progress in terms of international competitiveness of industrial exports, have spent far less on defense and big science but more on general university research support than the U.S., U.K., or France. Japan, which has made the most rapid productivity gains of any industrialized nation in the post-World War II period, has a very small program of direct R&D support but uses close industry-government ties to achieve a high level of innovative activity in industry.

(2) While the U.S. has slackened the pace of its R&D efforts relative to other nations, it remains pre-eminent by most measures of technological capacity. However, continuation of present trends is likely to produce a further narrowing of the "technology gap" between the U.S. and other nations. In the past, Europe and Japan have relied to a large extent on

adaptation of imported technology, often of U.S. origin, for productivity growth. But Germany and Japan are now rapidly approaching the U.S. in their capacity to create new civilian technologies.

(3) Absolute rather than relative technological advancement is the primary long run determinant of national welfare. Narrowing of the technology gap between the U.S. and its trading partners can yield benefits to the U.S. through lower import prices and expanded opportunities to adapt technological innovations originating abroad. However, because U.S. competitiveness in international markets is currently strongest for new and unique products, weakest for standardized products in which high labor costs outweigh the U.S. factor productivity advantage, further technological gains abroad are likely to exacerbate the trade adjustment problems of some U.S. industries. For these industries, Federal R&D support may be an appropriate part of industry trade adjustment assistance programs.

(4) Proposed policies to restrict the transfer abroad of advanced U.S. technology and thus slow down the product cycle could be counterproductive in their effects on U.S. competitiveness. If prevented from establishing foreign subsidiaries or licensing foreign production, U.S. firms currently serving foreign markets through exports may lose these markets to rivals abroad with lower costs. Furthermore, restrictions on the use abroad of new technology is likely to reduce the profits of innovating U.S. firms, thus deterring future R&D investments by these firms.

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(5) Because knowledge is a "public good," governmental support for R&D, particularly in the area of basic science, is required to ensure a socially adequate rate of production. The case for specific policies to foster industrial R&D (applied research and development) is weaker because industrial innovators are able to capture more of the gains from R&D investments. Also, recent case studies of actual industry experience abroad suggest that government policies to promote R&D are perceived by firms to have little or no effect on performance.

(6) The apparent gap between intended and actual effects of government action underscores the difficulty of tailoring national R&D programs to the achievement of specific policy objectives. Recent evidence has established that government policies with other primary objectives may be crucial in determining the level and success of industrial R&D activity. This appears to be particularly true in the case of safety and environmental regulation. The role of these policies requires more careful attention from policymakers and administrators.

Table A1

Allocation of Funds for Basic Research, by Source and Performer, 1976

(millions of dollars)

Source of funds	Research Performed by			
	Total, all Performers	Federal Government	Industry	Colleges and Universities and Other Nonprofit Organizations
Total	4,750	750	775	2,600 625
Federal government	3,210	750	170	1,825 465
Industry	715	-	605	75 35
Colleges and universities	525	-	-	525 -
Other nonprofit organizations	300	-	-	175 125

Source: National Science Foundation, National Patterns of R&D Resources, 1976, p. 23.

Table A2

Allocation of Funds for Applied Research, by Source and Performer, 1976
(millions of dollars)

Source of funds	Research performed by				
	Total, all Performers	Federal Government	Industry	Colleges and Universities	Other Nonprofit Organizations
Total	8,925	2,250	4,800	915	960
Federal government	4,825	2,250	1,250	545	780
Industry	3,645	-	3,550	35	60
Colleges and universities	250	-	-	250	-
Other nonprofit organizations	205	-	-	85	120

Source: National Science Foundation, National Patterns of R&D Resources, 1976, p. 25.

Table A3

Allocation of Funds for Development, by Source and Performer, 1976
(millions of dollars)

Source of funds	Research performed by				
	Total, all Performers	Federal Government	Industry	Colleges and Universities	Other Nonprofit Organizations
Total	24,415	2,600	20,925	145	745
Federal government	12,095	2,600	8,780	80	635
Industry	12,190	-	12,145	10	35
Colleges and universities	40	-	-	40	-
Other nonprofit organizations	90	-	-	15	75

Source: National Science Foundation, National Patterns of R&D Resources, 1976, p. 27.

Table A4

Research and Development Expenditures as a Share of GNP, by Country, 1963-1973

	Government Funded					Industry Funded				
	1963	1967	1969	1971	1973	1963	1967	1969	1971	1973
United States	1.9	2.0	1.7	1.5	1.3	0.8	1.1	1.1	1.0	1.0
United Kingdom	1.3	1.3	1.2	-	1.1	1.0	1.1	1.1	-	0.8
Japan	0.4	0.0	0.4	0.4	0.6	0.9	0.9	1.1	1.2	1.4
West Germany	0.6	0.7	0.7	0.9	0.9	0.8	1.0	1.0	1.2	1.4
France	1.0	1.4	1.2	1.1	1.0	0.7	0.8	0.7	0.7	0.6
Canada	0.6	0.9	0.9	0.8	0.6	0.3	0.4	0.4	0.4	0.3

Sources: OECD, Patterns of Resources Devoted to Research and Experimental Development in the OECD Area, 1963-71, Table V, p. 93 (for 1963-71), International Economic Report of the President, 1976 (for 1973).

- * Prepared for the Committee on the Changing International Realities, National Planning Association. Suggestions and comments of Committee members on an earlier draft are gratefully acknowledged. I am also indebted to Richard Freeman, Raymond Vernon, Zvi Griliches, E. M. Graham, and James Utterback for helpful discussions.
1. Kuznets (1977), pp. 5-8.
 2. Freeman (1977), pp. 97-98.
 3. Brooks, (1973), p. 16.
 4. See, for example, Boretsku (1975) and Gilpin (1975)
 5. Brooks (1973).
 6. Allen, et al, (1977). Gross National Product Statistics understate true productivity gains when these take the form of such unmarketed collective goods as improved air and water quality.
 7. Science Resource Studies Highlights, May 21, 1976, p. 1.
 8. For the definitions used in National Science Foundation surveys of R&D activity, see National Science Foundation, National Patterns of R&D Resources, 1953-1976, p. 17.
 9. National Science Foundation, Science Indicators 1974, pp. 2-3.
 10. Freeman (1977), p. 98.
 11. Brooks (1973 argues that U. S. defense and space research diverted scientific manpower and venture capital from civilian R&D.
 12. Although the U.S.S.R. does not publish statistics on its allocation of R&D resources, the fraction of total R&D devoted to defense is believed to exceed that of the U. S.
 13. Science Indicators 1974, p. 9.
 14. Ibid., p. 13.
 15. Ibid., pp. 13-15. In 1976, however, all Nobel prizes awarded went to U. S. scientists.
 16. Ibid., pp. 16-17.
 17. If patent statistics are to be used for international comparisons of commercial inventiveness, a more meaningful measure would be relative penetration of third country markets. This method compares national performance under a common set of legal and economic conditions.

18. Gellman Research Associates, Inc. (1975), a study commissioned by the National Science Foundation.
19. Science Indicators 1974, p. 20.
20. Ibid, pp. 22-24
21. Lowinger (1975).
22. International Economic Report of the President 1977, pp. 120-124.
23. U.S. shoe manufacturers injured by competition from imports are currently receiving Federal technical and financial assistance in modernizing their operations under an experimental Department of Commerce program.
24. As long as all investments can be viewed as entailing many independent projects, no allowance for risk need be included in this comparison. With a small number of large projects, however, returns to R&D or other investments should be adjusted for risk. This would be the case, for example, with a massive program to develop nuclear fusion as an energy source.
25. Table 13 shows internal rates of return, which depend upon the distribution over time of estimated costs and benefits of a particular R&D project. Tables 14 and 15 show perpetual rates of return, the calculated annual yield to the firm or industry from an additional dollar invested in R&D.
26. The Griliches and Jorgenson corrections gave rise to a heated methodological debate with Denison. An exchange of views was reprinted in the May 1972 issue of Survey of Current Business (Part II).
27. Stewart (1972), pp. 16-17.
28. Japan, the country which has experienced the highest productivity growth rate, has allocated the smallest share of its government support to defense, space, and nuclear R&D.
29. International Economic Report of the President 1977, Table 13, p. 145.
30. For a review of alternative trade theories and empirical evidence, see Stern (1975).
31. Hufbauer (1970).
32. "The Vital Need for Technology and Jobs," a speech by Dr. Thomas A. Vanderslice, Vice President, General Electric Company, to the Executives' Club of Chicago, November 5, 1976.
33. Japan has actually hastened this process by exporting the capital equipment of labor-intensive industries to lower-wage developing nations like Korea as local labor costs rise.

34. Mansfield (1976), pp. 88-89.
35. Harvey Brooks argues that "the concentration of R&D in a narrow range of sophisticated technologies for defense and space, in the United States, has diverted innovative talent and energy as well as venture capital away from civilian industry and from public needs other than defense and national prestige ... the spin-off from space-defense spending, especially R&D spending, has been largely a negative factor in the economy." Brooks (1973), pp. 14-15.
36. This does not mean, of course, that R&D would increase by the same percentage or dollar amount in each industry.
37. Some members of Congress view the expenses of independent research and development (IR&D) initiated by Federal contractors as a logical target for cost reduction efforts. The contractors say that these industry efforts are a legitimate cost of doing business and must be recovered in the price of goods sold -- including those sold to the Government. For the industry case, see Tri-Association Ad Hoc Committee on IR&D and B&P, Technical Papers on Independent Research and Development and Bid and Proposal Efforts, March 1974.
38. For some preliminary findings on the peer review process, see Cole, et al. (1977).
39. The degree of control achieved by "tying" of R&D funds to particular priority areas may be rather small, however, especially where R&D outcomes are difficult to specify in advance, as with most basic research.
40. For the U.S., level of direct support appears to be highest for those areas of R&D which are viewed as most essential to national welfare -- e.g., defense. In Japan, direct controls rather than financial support play an important role, and level of direct support is not likely to be a good indicator of national priority.
41. It should be noted that the normal treatment of most R&D costs is already more favorable than that of other capital expenditures. See Mansfield (1977), p. 91.
42. This case has been put most strongly by manufacturers of pharmaceuticals but probably applies as well to a number of other industries.
43. Brooks (1973), pp. 14-15.
44. See Gilpin (1975), pp. 41-44, Mansfield (1976), pp. 110-112.
45. Allen, et al. (1977).
46. Center for Policy Alternatives (1976). Allen, et al. (1977) reports results from this study concerning the effects of government policy on the innovation process.

47. However, managers in exporting firms may have played down the positive role of government to avoid any suggestion of export subsidization.
48. See National Science Foundation, Technological Innovation and Federal Government Policy, January 1967, pp. 1-3.
49. Mansfield (1976), p. 106.
50. Ibid. Also see Gilpin (1975). A progress report on ETIP is reprinted as an appendix to Gilpin's study.
51. A recent OECD study has surveyed changing national R&D priorities for the period 1961-1972. See OECD (1975).
52. See Pavitt (1974).

References

- Allen, Thomas J., James M. Utterback, Marvin A. Sirbu, Nicholas A. Ashford, and J. Herbert Hollomon (1977), "Government Influence on the Process of Innovation in Europe and Japan," Center for Policy Alternatives, M.I.T., May, forthcoming in Research Policy.
- Baily, M. N. (1972), "Research and Development Costs and Returns: The U.S. Pharmaceutical Industry," Journal of Political Economy, Vol. 80, No. 1, January/February, pp. 70-85.
- Brooks, Harvey (1973), "Have the Circumstances that Placed the United States in the Lead in Science and Technology Changed?" in David W. Ewing (ed.), Science Policy and Business: The Changing Relation of Europe and the United States, The John Diebold Lectures, 1971, Boston, Harvard University Graduate School of Business Administration, pp. 13-32.
- Brooks, Harvey (1974), "Science and the Future of Economic Growth," Journal of the Electrochemical Society, Vol. 121, No. 2, February, pp. 35c-42c.
- Center for Policy Alternatives (1976), National Support for Science and Technology: An Evaluation of Foreign Experiences, Cambridge, Mass., M.I.T.
- Christensen, Laurits R., Dianne Cummings, and Dale W. Jorgenson (1978), "Economic Growth, 1947-1973: An International Comparison," in J. W. Kendrick and B. Vaccara (eds.), New Developments in Productivity Measurement, Studies in Income and Wealth, Vol. 41, New York, Columbia University Press, forthcoming.
- Cole, Stephen, Leonard C. Rubin, and Jonathan R. Cole (1977), "Peer Review and the Support of Science," Scientific American, Vol. 237, No. 4, October.
- Denison, Edward F. (1962), Sources of Economic Growth in the United States and the Alternatives Before Us, Supplementary Paper 13, Washington, Committee for Economic Development.
- _____ (1972), Accounting for U.S. Economic Growth, Washington, Brookings Institution.
- Freeman, Richard B. (1977), "Investment in Human Capital and Knowledge," in Eli Shapiro and William L. White (eds.), Capital for Productivity and Jobs, Englewood Cliffs, N.J., Prentice-Hall, pp. 96-123.
- Gilpin, Robert (1975), Technology, Economic Growth, and International Competitiveness, Joint Economic Committee of Congress, Washington, D.C., U.S. Government Printing Office.

- Griliches, Zvi (1958), "Research Costs and Social Returns: Hybrid Corn and Related Innovations," Journal of Political Economy, Vol. 66, No. 5, October, pp. 419-431.
-
- _____ (1973), "Research Expenditures and Growth Accounting," in B. Williams, Science and Technology in Economic Growth, New York, Macmillan, pp. 59-95.
-
- _____ (1978), "Returns to Research and Development in the Private Sector, in J. W. Kendrick and B. Vaccara (eds.), New Developments in Productivity Measurement, Studies in Income and Wealth, Vol. 41, New York, Columbia University Press, forthcoming.
-
- _____, and Dale W. Jorgenson (1967), "The Explanation of Productivity Change," Review of Economic Studies, Vol. 34 (3), No. 99, July, pp. 249-284.
- Hufbauer, G. C. (1970), "The Impact of National Characteristics and Technology on the Commodity Composition of Trade in Manufactured Goods," in Raymond Vernon (ed.), The Technology Factor in International Trade, New York, Columbia University Press.
- Jorgenson, Dale W., Zvi Griliches, and Edward F. Denison (1972), "The Measurement of Productivity," Survey of Current Business, Vol. 52, No. 5, Part II, May, pp. 31-111.
- Johnson, Harry G. (1975), Technology and Economic Interdependence, London, Macmillan.
- Keesing, Donald B. (1966), "Labor Skills and Comparative Advantage," American Economic Review, Vol. 56, No. 2, May, pp. 249-258.
-
- _____ (1967), "The Impact of Research and Development on United States Trade," Journal of Political Economy, Vol. 75, No. 1, February, pp. 38-48.
- Kuznets, Simon (1977), "Two Centuries of Economic Growth: Reflections on U.S. Experience," American Economic Review, Papers and Proceedings, Vol. 67, No. 1, pp. 1-14.
- Leontief, Wassily (1954), "Domestic Production and Foreign Trade: the American Capital Position Re-Examined," Economia Internazionale, Vol. 7, No. 1, February, pp. 3-32.
- Lowinger, Thomas C. (1975), "The Technology Factor and the Export Performance of U.S. Manufacturing Industries," Economic Inquiry, Vol. 13, No. 2, June, pp. 221-236.
- Mansfield, Edwin (1965), "Rates of Return from Industrial Research and Development," American Economic Review, Papers and Proceedings, Vol. 55, No. 2, May, pp. 310-322.

- _____. (1976), "Federal Support of R&D Activities in the Private Sector," Joint Economic Committee, United States Congress, Priorities and Efficiency in Federal Research and Development, Washington, D.C.
- Minasian, Jora R. (1969), "Research and Development, Production Functions, and Rates of Return," American Economic Review, Papers and Proceedings, Vol. 59, No. 2, May, pp. 80-85.
- National Science Foundation (1972), Research and Development and Economic Growth/Productivity, Washington, D.C.
- _____. (1974), The Effects of International Technology Transfers on U.S. Economy, Washington, D.C., July.
- _____. (1975), Science Indicators, 1974, Washington, D.C.
- _____. (1976), Science Resource Studies Highlights, Washington, D.C., various issues.
- _____. (1976), National Patterns of R&D Resources, 1953-1976, Washington, D.C.
- _____. (1976), Technological Innovation and Federal Government Policy, Washington, D.C., January.
- Organization for Economic Cooperation and Development (1975), Patterns of Resources Devoted to Research and Development in the OECD Area, 1963-1971, Paris.
- _____. (1975), Changing Priorities for Government R&D, Paris.
- Pavitt, Keith (1974), "'International' Technology and the U.S. Economy: Is There a Problem?", in The Effects of International Technology Transfers on U.S. Economy, Washington, D.C., National Science Foundation, July.
- Rosenberg, Nathan (1976), "Thinking About Technology Policy for the Coming Decade," prepared for the Joint Economic Committee, U.S. Congress, Washington, D.C., September.
- Solow, Robert (1957), "Technical Change and the Aggregate Production Function," Review of Economics and Statistics, Vol. 39, August.
- Stern, Robert M. (1975), "Testing Trade Theories," in Peter B. Kenen (ed.), International Trade and Finance: Frontiers for Research, Cambridge, England, Cambridge University Press.
- Stewart, Charles T., Jr. (1972), "A Summary of the State-of-the-Art on the Relationship Between R&D and Economic Growth/Productivity," in Research and Development and Economic Growth/Productivity, Washington, D.C. National Science Foundation.

- Terleckyj, Nestor E. (1960), Sources of Productivity Advance, unpublished Ph.D. dissertation, New York, Columbia University.
- _____ (1974), Effects of R and D on the Productivity Growth of Industries: An Exploratory Study, Washington, D.C., National Planning Association.
- _____ (1978), "Estimating Direct and Indirect Effects of Research and Development on Productivity Growth by Industries," in J. W. Kendrick and B. Vaccara (eds.), New Developments in Productivity Measurement, Studies in Income and Wealth, Vol. 41, New York, Columbia University Press, forthcoming.
- Tri-Association Ad Hoc Committee on IR&D and B&P (1974), Technical Papers on Independent Research and Development and Bid and Proposal Efforts, Washington, D.C., March.
- U.S. Department of Commerce (1972), Technology Enhancement Programs in Five Foreign Countries, Washington, D.C., December.
- U.S. International Economic Report of the President, Washington, D.C., various years.
- Vernon, Raymond (1966), "International Investment and International Trade in the Product Cycle," Quarterly Journal of Economics, Vol. 80, No. 2, May, pp. 190-207.
- Weisbrod, Burton A. (1971), "Costs and Benefits of Medical Research: A Case Study of Poliomyelitis," Journal of Political Economy, Vol. 79, No. 3, May/June, pp. 527-544.

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CORPORATE
RESEARCH AND
DEVELOPMENT

May 26, 1978

The Honorable Adlai E. Stevenson, III
United States Senate
R50B - Room 411
Washington, D.C. 20510

Dear Senator Stevenson:

I am pleased to have had the opportunity to participate in the joint hearings of your subcommittees on high technology exports. You indeed are building a remarkably comprehensive background of information on this subject of vital importance to the economic well-being of our nation.

I would like to follow up on a line of inquiry that you and Senators Proxmire and Schmitt pursued at one point in the discussion period. In essence, you were looking for ideas for how the multiple, and sometimes conflicting, policies and actions of various government agencies could be coordinated so as to avoid unintended and unnecessary obstruction of industrial innovation and export sales.

In my view, the now defunct Energy Resources Council provides a useful organizational model for accomplishing such an objective. As you know, the ERC was established for similar reasons at a time of recognized high national need. With top-level representation from those agencies and regulatory bodies that affected Federal energy policies and actions, the ERC was, for a time, a very effective approach to the facilitation and coordination of many complex inter-agency problem solutions.

Senator Schmitt was right on target, of course, when he observed that any such interagency coordination toward a high priority national objective depends on clearly demonstrated recognition of that high priority by the President, himself. The top-level attention received by issues which the ERC addressed was effective in breaking many bureaucratic log jams and avoidance of some contradictory policies and actions.

In my judgment, the scope of such a body should encompass the broad spectrum of policies affecting industrial innovation - from scientific discovery through commercial application. This means that the preponderance of representation would not be from those agencies affecting R&D alone, but would include those which broadly impact the environment for innovation; for example, key agencies affecting monetary, fiscal, economic, foreign and regulatory policy.

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The Honorable ADlai E. Stevenson, III
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In connection with this notion of the very broad range of Federal policies affecting innovation, you may be interested in views expressed to Dr. Frank Press by industry R&D vice presidents, including General Electric's Dr. A. M. Bueche. A summary of these views, prepared by Dr. Press' office, is enclosed.

Again, I am very encouraged by the attention you are giving to this important issue, and I would be pleased to provide further assistance as you may require.

Sincerely,



Lowell W. Steele, Manager
Research and Development Planning

LWS:mg

Enclosure

cc: Senator Proxmire
Senator Schmitt

VIEWS OF INDUSTRY R&D
 VICE PRESIDENTS
 on
 FEDERAL POLICY
 and
 INDUSTRY R&D AND INNOVATION

as expressed to
 Dr. Frank Press, Director
 Office of Science and Technology Policy

Through a continuing series of meetings and written communications, a group of R&D Vice Presidents of a number of large, technology intensive U. S. firms has been conveying its thoughts to Dr. Press on the impact of government policy on industry R&D and innovation. The following is a compilation and summary of these views. In no case was a view expressed by all members of the group, nor have all yet been asked to comment on the views of others. The order of presentation is intended to indicate roughly the overall importance attributed to particular issues.

ENCOURAGEMENT OF INDUSTRIAL INNOVATION

Government investment in civilian-oriented research, development, demonstration or commercialization

- . is not as efficient as multiple competitive private investments;
- . tends to result in technology push which is not as effective as market pull; and
- . sometimes replaces rather than augments private investment.

Consequently the government should encourage private R&D and focus on the elimination of regulatory, financial, and other disincentives to commercialization by the private sector. The following factors tend to inhibit private R&D and innovation investments.

Government Regulation

1. The growing complexity of and uncertainty about future laws and

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regulations make new investments less attractive and reduce the willingness of some industry R&D managers to pursue basically new concepts.

2. New environmental, health, and safety legislation and regulations are too infrequently assessed for their impact on investment and industrial innovation. Potential costs should be identified and compared with expected benefits before action is taken.

3. Many industries are forced to spend substantial proportions of their R&D budget to defend their manufacturing processes, product lines, and market against ever-changing requirements of government regulations, leaving less for innovation. Similarly, capital investment in plant to meet regulatory requirements has reduced the capital available for new plant required for innovation in products and services.

4. Inflexible regulations or legislation (e.g. the Delaney amendment) and required laboratory test procedures combine to prejudice test programs against new products. Zero risk criteria are unrealistic and should be replaced by risk-benefit evaluations. As examples of current uncertainty, there is considerable apprehension about how the TOSCA will be administered and how Good Laboratory Practices regulations will be created.

5. Government interventions of this kind increasingly drive R&D overseas and result in products being marketed elsewhere before they are marketed in the U. S.

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Tax Policy and Capital Availability

1. Uncertainties about future changes in tax and other economic policies tend to restrain the flow of funds into innovation investments and long-range R&D, as industry tends to favor investments with a more immediate return, under these circumstances.
2. Government tax and other economic policies should be reviewed for their impact on industry R&D and innovation. Currently, they tend to limit the amount of funds available for R&D and innovative investment and also in other ways are not as encouraging of industrial R&D as they could be. Tax and other economic policies should be reviewed to provide greater financial incentive to entrepreneurs. (Simply leaving them unchanged could be an improvement over continued change.)
3. Tax policy with respect to individuals makes it more difficult for entrepreneurs to obtain venture capital.
4. More rapid depreciation rates tend to reduce capital at risk in the initial period of innovative investments and make such investments more attractive, especially during periods of high inflation.

The foregoing two categories are considered to be important by virtually all industry participants in the discussions. The following areas are also worth attention, but rank lower in importance or have only selective appeal to the participants.

Anti-trust

Anti-trust laws are interpreted in ways that make cooperative research within an industry difficult.

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Patents

Some government policies regarding ownership of patents, created partly or wholly through Federal funds, hamper industrial innovation.

Government Procurement Policies

Properly tailored procurement programs might stimulate innovation.

Government Funding of Industry R&D

Government agencies should fund R&D in industry in support of the agencies' missions only when private support for this R&D remains insufficient. In particular, R&D with low expected economic return but high expected social benefit should receive government support, and it may also be useful when applied to expensive demonstration phases for major new projects of national importance.

INTERNATIONAL ISSUES

1. The government should consider means of helping some U. S. industries compete with foreign government enterprises or firms receiving support of foreign governments.
2. The U. S. government could usefully learn from the policies of other countries such as Japan regarding innovation in selected industries.

INDUSTRY/UNIVERSITY/GOVERNMENT RELATIONSHIPS

1. Basic research belongs primarily in the universities and should receive strong government support.

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2. Better mechanisms are needed for the transfer of new knowledge from universities to industry and to make university research more responsive to industry needs. It is not clear what the government role, if any, should be in this, but whatever is done should be mutually attractive to universities and industry.

Statement By The
Man-Made Fiber Producers Association

The Man-Made Fiber Producers Association represents member firms which manufacture more than 90 percent of the man-made fibers produced in the United States. In 1977, 73 percent of the fibers consumed in American textile mills were man-made, with about 27 percent being cotton and wool.

Thus, our industry is an integral part of the broader fiber/textile/apparel industry which provides jobs for more than 2.5 million Americans.

This vital industry is threatened by rapid growth of imported textiles, increasing from \$1.1 billion in 1966 to \$5.9 billion in 1977. Last year our negative balance of payments in textile products amounted to \$3.4 billion. Current textile imports in all forms have reduced U.S. employment by more than 350,000 jobs and additional displacement is occurring at the rate of about 20,000 jobs a year.

This Association believes that all fiber, textile and apparel products should be exempted from any tariff reductions during the Multilateral Trade Negotiations in Geneva. Tariffs are the only permanent form of protection our industry has against rapidly increasing imports from low-wage countries. We do not believe our duties should be bargained away for either a reduction of duties by other countries or the elimination of existing non-tariff barriers to trade.

However, we are pleased to have the opportunity to describe some of the non-tariff barriers to trade which exist in the world today. Foreign tariffs, with limited exceptions, seldom are the sole barrier to the sale of U.S. man-made fiber abroad. It is

especially noteworthy as an example that Japanese exports of textile fiber and fabric to the European Economic Community (EEC) and the European Free Trade Area (EFTA) have never achieved any significant penetration although duties as such are not significantly higher and are lower in many cases than those levied in the U.S. According to the latest statistics, EFTA imports from Japan of textile yarn, fabrics, made-up articles and related products were only 1.4% of total imports in 1974. The comparable figure for EEC imports from Japan was 1.2%.

High tariffs usually are found only in the less developed countries. In most cases, these are countries where the tariffs have been imposed to protect relatively small scale and therefore high cost man-made fiber production. Non-tariff barriers are a more effective way to deny sale of products in less developed countries as well as developed countries. Some examples of non-tariff barriers to trade are:

1. Regional preferential trading agreements. Under the Free Trade Agreements (FTA) signed by the expanded EEC with the individual countries of the European Free Trade Area, the import duties on most industrial products were eliminated on products traded within the area as of July 1, 1977. Thus a greatly expanded European free trade makes it more difficult for U.S. and other non-Western European suppliers to compete.

2. The EEC and EFTA Rules of Origin single out textiles for special treatment and are potentially the most important foreign NTB. By requiring that two or more processing steps be performed to qualify for preferential status, U.S. suppliers of

yarn or fabric are at a distinct disadvantage vis-a-vis a supplier from the area. For example, a U.S. origin filament or spun yarn made into a fabric in an EEC country and then exported in fabric form to an EFTA country will find the fabric dutiable at the full value. Thus the exporter of the fabric with U.S. origin yarn will find it more difficult to compete in price with the duty-free fabric made from area yarn. Rather than maintain fabric production and stocks with both U.S. origin and area yarn, and not knowing the final destination of his production, the European mill will find it much simpler not to buy U.S. yarn. Such actions are already occurring.

U.S. exports to Western Europe are significant and have the potential to be seriously affected under the Rules of Origin. In 1976 these exports are estimated at about 370 million lbs., split as follows:

	<u>Total Exports</u>	<u>Of Which Man-Made</u>
Fibers/Yarns*	170	165
Fabrics	<u>200</u>	<u>55</u>
TOTAL	370	220

3. Under the Generalized System of Preferences offered to the less developed countries by the EEC, man-made fiber fabrics (except printed fabrics) designated eligible for duty-free treatment must be made from yarn of EEC origin or that of the developing country. The use of U.S. raw materials would make the product ineligible. This EEC requirement thus discourages the use of U.S. and other non-origin products.

4. Exports to Japan are subtly but effectively controlled by the Japanese trading companies and their intimate relationships

with the Japanese producers, banks and government. It is virtually impossible for U.S. fiber producers to export to Japan anything other than products not made in Japan or which are in short supply. In 1976, U.S. exports of man-made fibers and yarns to Japan were only 4.4 million pounds, while imports of the same products from Japan were 54.9 million pounds.

5. Foreign exports of fiber often are subsidized directly or indirectly by their government's tax structure. Countries which have a Value Added Tax (VAT) exempt exported items while U.S. exports are subject to the appropriate corporate taxation. Thus U.S. exports to V.A.T. countries are taxable under the V.A.T. system and become an integral part of the foreign tax revenue base, in addition to paying the tariff. On the other hand, foreign exports to the United States are subject only to a tariff. The exemption of exports from the V.A.T. gives those exporters a relative advantage also in third markets. Another example, South Korea exempts exports from its business tax.

6. Export financing at rates significantly below commercial rates is provided in many countries (e.g., Brazil and South Korea).

7. A new type of non-tariff barrier is becoming important on the world scene. It is a rapidly growing group of barter-type deals in which companies involved in supplying plants and technology to third countries take products as part payment. In particular, the chemical industry in Western Europe is facing this problem now as some 200 plants using Western technology are scheduled to come on stream in Eastern Europe in the next five years. One example of this is the ICI buy-back agreement with the U.S.S.R.

for methanol. On the man-made fibers scene, Algeria's National Mining Co. will provide 132 million lbs. per year of phosphate rock to Finland's Kemire Oy in return for Finnish viscose fiber of equal value during 1977-1979. Such deals effectively reduce the market for U.S. and other outside suppliers.

8. A more subtle and complex form of non-tariff barrier may be discerned in foreign governments' deliberate policies to undervalue their currencies. In efforts to keep their currency cheap to make export prices lower and more attractive, they also make prices for imports higher and less attractive. The burden falls on the domestic consumer in these countries who will pay relatively higher prices. This may be termed a "tax" paid by the consumer but which "subsidizes" the exporter. In effect, this form of "tax subsidy" reduces the access to these markets for U.S. products. Furthermore, U.S. products are less competitive in third markets relative to the subsidized exports from these countries.

The issues involved in the Rules of Origin, the VAT systems, and the impact of undervalued foreign currencies are complex. Each of these non-tariff barriers would probably require a full and detailed study to completely develop the current and future impact on U.S. and world trade.

In summary, we urge that the United States tariff rates on fibers, yarns and other textile products not be bargained away for either lower foreign tariff rates or the elimination of non-tariff barriers in other countries.

Foreign non-tariff barriers can take many forms and one can be used to replace another, usually by administrative decree. Unless control can be obtained over the application or adoption of new or alternate NTBS, it would be short-sighted to barter lower U.S. tariffs for concessions in current foreign non-tariff barriers. Moreover, in the case of the Rules of Origin which were applied unilaterally, no U.S. concession should be deemed necessary to obtain its modification or elimination.

We appreciate the opportunity to comment on this most important subject and we stand ready to provide any additional information that may be desired.



May 15, 1978

The Honorable Adlai E. Stevenson
Chairman
Subcommittee on International Finance
Committee on Banking, Housing, and
Urban Affairs
United States Senate
Washington, D.C. 20510

Dear Senator Stevenson:

The Semiconductor Industry Association (SIA) wishes to express its support for the written statement presented to the Subcommittee on International Finance by the Electronic Industries Association (EIA), dated March 9, 1978; and for the written statement to be presented to the Subcommittee by the American Electronics Association (AEA), dated May 16, 1978.

Semiconductors are components of the high technology and electronic equipment manufactured by the member companies of EIA and AEA. The strength and growth of the semiconductor industry, therefore, is fully dependent on a prosperous high technology and electronics industry. International trade amounts to one third of the volume of United States based semiconductor manufacturers. When this volume is added to the exports of semiconductors incorporated into the assembly of end product electronic equipment, SIA estimates that nearly one half of the semiconductor industry's volume is in international trade. With this in mind, SIA supports the recommendations of AEA and EIA toward improving those conditions of international trade, which are now injurious to the United States.

Specifically SIA supports the recommendations which would:

1. Increase research and development within the US, with indirect financial incentives through the federal tax system;
2. Improve the rate of equity capital formation by individuals through reduction of the capital gains tax rate to the pre-1969 level (twenty-five percent);

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3. Eliminate or equalize tariffs facing US semiconductor exports, particularly in Europe and Japan;
4. Move for the reduction of non-tariff barriers facing semiconductor exports, particularly in Japan; and
5. Initiate the development of a national economic policy which recognizes the importance of exports to our economy.

The US semiconductor industry's world leadership position was achieved during a period of favorable business climate and technological innovation. Based on this performance record the semiconductor industry can meet the present challenge, if the competitive battle for exports is free, fair, and open.

In conclusion, we wish to express our endorsement and gratitude for your efforts on behalf of international trade, and for those of the Subcommittee. Our apologies are offered for any inconvenience which the SIA's decision to forgo public testimony at this time may have caused. Out of appreciation for the Subcommittee's time and interests it is our circumstance that adequate, detailed, and comprehensive address to the questions ennumerated in your letter of April 26, 1978, is beyond our capacity to produce by the assigned hearing date. We shall, however, pursue these as well as other lines of inquiry as part of our participation in the Trade Study Group, in cooperation with the Departments of State and Commerce, and the Office of the Special Trade Representative. As we progress we look forward to future cooperation and dialogue with you and your Subcommittee. In light of your recognition of the importance of this problem to our nation's future economic viability, we remain ready to assist the Subcommittee, within the limits of our resources, in whatever way possible.

Sincerely,

John Van Saun /JA

John Van Saun
Director of Policy and Strategy

JVS/jg
cc: Mr. Gary Welsh

U.S. Agricultural Exports to COMECON: Problems and Potentials
Stephen C. Schmidt*

USSR

Grain trade pattern. The USSR occupies an important position in the world grain economy. It is the world's largest wheat producing and consuming area, normally producing as much as the United States, Canada, Australia, and Argentina combined. Russia accounted for about 24 percent of the world's annual wheat output in recent years (Table 1). The influence and position of the USSR as a trader in world markets has been changing. During most years in the 1955-1971 period, the Soviet Union was a net exporter of grain, ranging from 1.5 to 7.8 million tons a year (Appendix Table 1). An exception was in 1964-1966 when poor harvests forced the USSR to import large quantities of wheat representing about 13 to 17 percent of world trade. In 1971/72 and 1974/75, grain exports and imports were about in balance. In other years in the 1970s, however, Russia became a large net importer of grain, approximating the purchases made by the European Community and Japan. Thus in 1972/73 and 1975/76 Russia's wheat imports totaled 15.6 and 10.1 million tons, equivalent to 22 and 14 percent of world trade respectively (Table 2). For 1977/78, Russian wheat imports are projected to approximate 10 percent of world trade. Until 1970/71, Soviet imports of coarse grains were small; but thereafter, excepting 1972/73, Russia imported more coarse grains than wheat. Because of the sharp and erratic variability in its wheat imports, the Soviet Union appears to be responsible for about 80 percent of the annual fluctuations in world trade in wheat during the past decade.

Canada has maintained a near monopoly position in wheat export sales to Russia until 1971/72, supplying between one half to 88 percent of total import requirements (Table 3). Canada's exports to the Soviet Union have been covered by a series of three-year master contracts between the Soviet Exportkhleb,

* Professor of Agricultural Marketing and Policy, University of Illinois, Urbana-Champaign.

the Soviet grain trading organization, and the Canadian Wheat Board. Since 1972/73 the United States became Russia's major supplier of both wheat and coarse grain imports (Tables 3 and 4). Overall, the United States supplied 55 percent of the Soviet grain imports during the 1972-1976 period.

Russia has been a consistent exporter of wheat the bulk of which was sent to Eastern Europe. Likewise Eastern Europe purchased most of Russia's coarse grain exports (Table 4). Cuba and North Korea were other important markets for Russia's wheat whereas Cuba and Western Europe were residual outlets for coarse grains.

Eastern Europe

Eastern Europe has been a consistent net wheat importing area, accounting for between 7 to 10 percent of world imports in recent years (Table 2). Imports into the area varied widely from year to year, reflecting changes in domestic availabilities. Normally the Eastern European countries have an overall net wheat deficit of over 3 million tons annually; in 1976/77, the deficit rose to 5.2 million tons (Appendix Table 1). Eastern Europe relies heavily on the USSR for its grain supplies--75 percent of the area's total wheat imports in 1957/58 to 1961/62 and 55 percent in 1974/75. The United States was the second and Canada the third-ranking source of East European wheat imports. The United States supplied about 27 percent of Eastern Europe's wheat imports in 1974/75. Volumewise coarse grain imports surpassed wheat imports since 1972/73 and in the current 1977/78 year are expected to reach more than double the level of wheat imports. The largest importers of coarse grains are East Germany, Poland and Czechoslovakia. The United States has been a major supplier of coarse grains to this area. By contrast the USSR has become a declining source for Eastern Europe's coarse grain imports.

Grain production pattern

USSR. Russian grain output fluctuates widely from year to year with the annual variation ranging from a low of 5 million tons in 1960-61 and 1970-71 to a high of 84 million tons in 1975-76 (Appendix Table 2).

Russian grain production, wheat production in particular, is greatly influenced by the weather. During the 1960-1977 period, the USSR suffered six major reverses in grain production, three of which occurred in the 1970s. The three major production shortfalls in the 1970s were experienced in 1972, 1975, and 1977. Altogether, the annual fluctuation in grain output averaged 30.5 million tons, representing 17.6 percent of production. It is generally agreed that there are few countries whose crops are exposed to more violent changes in climatic conditions than those of the USSR. The adverse effect of the latitudinal position is aggravated by inadequate rainfall and inclement weather during the harvesting season. But beyond this, insufficient investment in agriculture and organizational and management inefficiencies are equally pervasive influences.

The five-year average grain output under the 1966-70 plan period averaged 167.6 million tons and averaged 181.5 million tons during the 1971-75 plan period.

For 1977, Soviet grain production was estimated at 195.5 million tons, compared to the record crop in 1976 of 223.8 million tons. At 195.5 million tons, this outturn is around 18 million tons below the 1976/77 target of 213.3 million tons.

Eastern Europe. The region achieved impressive gains in grain production, both wheat and coarse grains. Coarse grains represent about two-thirds of total grain output of the region. The growth in output is due to rising yields as

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the area planted to grains has been fairly stable in the 1970s. Eastern Europe is not a major grain producing area accounting for only 7 percent of world grain output in the 1970s (Table 1).

Grain consumption pattern

USSR. The Soviet Union uses a large quantity of grain each year, about 215 million tons in 1976/77. The government's emphasis on producing more livestock has widened the gap between the country's rate of growth of production and consumption, particularly for animal feed.

The use of grain for feed clearly reflects changes in Soviet livestock inventories. The volume of grain fed annually increased by about 5 million tons, on the average, in the 1960s by 4 million tons between 1970 and 1974, and by 7 million tons between 1976 and 1977. The USSR has in the past reduced its grain-consuming animal population, mainly hogs and poultry, to hold down feed usage and hence grain imports. The most recent livestock cutback was in 1975-76 when the hog population was reduced to 58 million from the previous year's level of 72 million and that of chicken to 735 million from 792 million (Appendix Table 3). While chicken inventories were rebuilt by 1977 the number of hogs is still below their 1975 level. Roughage-consuming animals are obviously more easily sustainable at times of poor grain harvests than those subsisting largely on grain rations. Cattle numbers on Soviet farms were reduced only slightly during the recent tight feed situation.

There is little scope for reducing the food and industrial use of grain. Some saving in food consumption of grain might be effected by raising the milling rate. However, this would result in darker, heavier breads than normal. Feed use now accounts for about 52 percent of Soviet grain utilization. Changes in the relative price of livestock feeds encourage substitution of the lower

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priced for higher priced products. Thus substitution takes place between (1) coarse grains and feed wheat; and (2) grains and nongrain feedstuffs. Low-grade wheat and coarse grains are being widely substituted for the higher-priced oilseed meals as sources of protein.

Eastern Europe. Total grain consumption expanded markedly in the past 15 years reflecting mainly the increased utilization of coarse grains. Most of the grain used is for livestock feed to support the increase in livestock production. Poland is the region's largest grain consumer followed by Romania and Yugoslavia. But whereas the latter two are able to meet their consumption requirements from domestic production, Poland had to rely on import supplementation. Hungary is another net grain exporter and Bulgaria is largely self-sufficient in grain production. In 1976/77 Eastern Europe accounted for about 8 percent of world grain consumption, a slight gain over the share in the early 1960s (Table 1).

Growth Targets for 1976-80

USSR

General economic growth targets. Slower economic growth targets were set for the new 1976-80 five-year plan than in the preceding one. The downward revision is attributed to (1) the 1975 crop failure; (2) a shift of emphasis to quality; and (3) improving efficiency in production. Other considerations entering in this decision are: (1) a costly drive to develop Siberia; (2) the high cost of antipollution measures; and (3) the upgrading of living standards of Soviet citizens.

Guidelines for 1976-80 stipulate lower growth rates in nearly every key economic sector, except foreign trade, the production of grains, and raw materials such as oil and natural gas.

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Industrial expansion for 1976-80 was set at from 35 to 39 percent, with greater stress on heavy industry such as machine-building than on consumer industry. The 1971-75 plan called for 47 percent industrial growth but only 43 percent growth was actually achieved.

National income is slated to grow 24 to 28 percent, compared with a goal in 1971-75 of 38.6 percent; in fact national income has grown only 26 percent since 1970.

Foreign trade is planned to increase 30 to 35 percent, about the same goal of the past five-year plan.

Agricultural production targets. Soviet agricultural plans for 1976-80 point toward a slowdown in the rate of growth to 16 percent annually. The 1971-75 plan aimed at annual increases of 20 to 22 percent but achieved only 13 percent growth annually.

For grain the 1976-80 target is an annual output of 215-220 million tons, a goal that the USSR achieved only once. The 1971-75 plan called for an annual crop of 195 million tons but, as indicated earlier, achieved an average yield of 181.5 million tons. The 1976-80 grain production target requires a 19 to 21 percent growth compared with the 20 to 22 percent planned earlier. In volume terms the 1976-80 target demands an almost threefold increase on the 1971-75 average gain of 13.3 million tons. The principal task, according to the plan guidelines, is the utmost raising of grain production. This suggests that the Soviet leadership intends to continue the task of upgrading the quality of their people's diet in terms of more livestock products.

The achievement of grain production goals will require continued investments in mechanization, expanded fertilizer use, more irrigation, and development of stronger varieties of grain seed. Related to these are the raising of

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crop yields and reduction of fluctuations in grain production. There is much potential for increasing feed supplies by means of raising yields of grain, forages, and oilseeds. Average grain yields in the USSR are about half those in the US and that of pasture and hay lands only one-third to one-half those in the US. The USSR has nearly 1 billion acres of relatively unproductive land in pastures and meadows.

For reducing some of the yield variability, the USSR plans to shift more acreages to winter grains. Records show that winter grains not only yield more per acre but also have less yield variability than spring grains.

The meat production goal was set for an average annual output of 15-15.6 million tons compared with production of 14.5 million tons in 1974. Meat production is slated to increase by 7 to 11 percent compared with the 18 percent which occurred during 1970-74.^{1/} Other targets are 13 to 19 percent increase in egg production compared with the 43 percent increase of the past four years; and 8 to 10 percent increase in milk production compared with a past 8 percent. Barring imports, these production goals, especially for meat, will provide a rather small improvement in per capita Soviet livestock product consumption.

USDA analysts expect that Soviet feed usage will approach 150 million tons by the end of the current five-year plan. This would comprise 25 million tons of nongrain concentrates, and 125 million tons of grain.

Large in the picture is the likely growth in consumption of high protein feeds in the USSR as well as in Eastern Europe. Feeding rates for protein feeds are still markedly below Western standards and thus there is scope for improvement. Calculated by Western standards, USDA estimates suggest that Soviet high protein feed requirements by 1980 could reach 14.1 million tons, soybean meal equivalent from 12 million in 1975, and could be as high as 14.7 million tons.^{1/} Of these requirements, oilseed and fish meal consumption would

1/ In 1977 Soviet meat production already achieved the target of 15 million tons.

represent between 6.8 to 7.2 million tons, owing to heavy feeding of other high protein feeds. Assuming that the Soviets produce 5.1 to 5.9 million tons of oilseed meals and fishmeal by 1980, their import requirements could range from 1.3 to 1.7 million tons, equal to the protein content of 60 to 80 million bushels of soybeans.

The Soviets are making a major effort to narrow the existing severe protein gap and to prevent it from growing wider in future years. Experiments are directed for the development of new protein rich crops as well as for new non-plant sources of protein. Regarding plant protein sources, emphasis is placed on high lysine corn, high-protein barley and development of new varieties of lupines. Considerable progress has been made in production of nonplant sources of feed protein. The Soviets have expanded production of urea and single-celled protein including bacteria, algae, and feed yeasts. The 1975 production goal for yeast and yeast based feed supplements was set at nearly 700,000 tons. Neither new plant nor nonplant sources of protein are seen to be able to cover Russia's feed protein requirements in the near future.

To facilitate the achievement of agricultural goals, investments are budgeted at the equivalent of about \$239 billion, sharply higher than the investments of \$163 billion these past five years.

Eastern Europe. Agricultural growth planned for 1976-80 and estimated annual growth rates for 1966-70 to 1971-75 for Eastern European countries are given in Table 5. Agricultural growth plans for 1976-80 range from 2.7 percent in Czechoslovakia to 5-5.5 percent in Romania. Planned growth is greater than what was achieved in the previous 5-year period (1971-75) for all countries except Czechoslovakia, Poland and Hungary. In most cases the crop sector is planned for faster growth than the livestock sector in Eastern Europe. Each country has a goal of selfsufficiency in temperate-zone food

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products but the 1976 drought has reduced chances of reaching this goal in the 1976-80 period. Overall, only Czechoslovakia appears to have the prospect for achieving grain-selfsufficiency among the grain deficit countries. None of the East European countries is expected to be able to meet their growing needs for protein feeds.

Table 5 . Average Annual Growth Rates in Gross Agricultural Production, Eastern Europe, 1971-75, and Plans for 1976-80

Country	1966-70 to	1971-75 to
	1971-75	1976-80
Bulgaria	3.1	3.7
Czechoslovakia	2.7	2.7
GDR	2.1	3.4
Hungary	3.4	3.2
Poland	3.7	3-3.5
Romania	4.6	5-5.5
Yugoslavia	3.2	3.9

Source: Eastern Europe Agricultural Situation, Review of 1976 and Outlook for 1977. Foreign Agricultural Economic Report No. 134, USDA, ERS, p. 17.

Implications and Trade Prospects

Factors affecting US-USSR trade. US-Soviet trade in grains and feedstuffs has been affected singularly or jointly by a number of factors including (1) variability in grain output as shown by the disastrous crop failures (1963-65, 1972, and 1975); (2) Soviet supply commitments to Cuba and Eastern Europe; (3) trade and credit agreements; and (4) access to Western markets and credits.

The agreement of 1972 was essentially a short-term credit agreement whereby the USSR could make purchases on credit, extended through the Commodity Credit Corporation, at going interest rates and regular terms. The purpose of this agreement was to promote the development of the USSR as a market for American grain.

There has been a change in Soviet policy toward supplying the grain needs of the Eastern European countries. Up to 1975 the USSR purchased grain on the

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world market, when need arose, to meet Soviet commitments in Eastern Europe. In 1975, the East European countries were asked to purchase their own needs.

Future Soviet grain and feedstuff imports will depend, in addition to factors indicated above, on (1) the country's ability and willingness to achieve its feed and livestock production targets; (2) the improvement of livestock feeding efficiency; (3) further expansion in storage facilities and the establishment of grain reserves; (4) revival of economic activity in the West; and (5) adherence to the US-USSR Grain Supply Agreement of 1975.

First and foremost, Soviet imports will hinge on whether the proposed 1976-80 grain production goal of 215 to 220 million tons per year are met and livestock expansion targets pursued.

Despite the 1975 setback, Russian plans do not indicate the abandonment of earlier intentions to upgrade consumer diets. There are signs, however, that the USSR was forced to modify the goals of the livestock program. The pace of expansion of the livestock industry has already been reduced below the rates targeted in the preceding 5-year plan. It is probable that expansion during 1976-80 will be more closely tailored to growth of domestic grain and feedstuff production than heretofore. The attractiveness of such alignment is predicated both by political considerations and economic necessities. It would be politically untenable to set livestock production and consumption goals sustainable only with imported grains and protein feeds. Maintenance of past rates of production and consumption expansion would turn Russia and Eastern Europe into a substantial net importer of grain for years to come. Under any circumstances a growing deficit in nongrain feed concentrates, particularly oilcake and meal, is in prospect. To pay for huge grain imports would require the diversion of scarce foreign exchange from the purchase of industrial and

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high technology goods, forcing a slowdown in the tempo of industrial development. For the same reason the importation of meat and dairy products does not offer a viable long-term solution to the livestock supply problem. One way to relieve consumption pressures would be the removal of government subsidies and raising retail prices of livestock products.

Mitigating the feed shortage in the long term would be the improvement of the efficiency of feed utilization.^{1/} Russia's feeding inefficiency stems from several factors. A major one is the low level of total feed intake. Another factor is the inadequacy of high protein ingredients in the ration. It has been estimated that in 1970/71 the deficit in the livestock sector was equivalent to the protein content of about 10 million tons of soybeans.^{2/} Unbalanced feed rations reduce feeding efficiency and increase grain consumption per unit of output. Poor labor efficiency is another underlying barrier.

Improving feed utilization efficiency may be pursued in a number of ways some of which are both costly and long term. These include the use of better livestock breeds, improved livestock feeding facilities, increased supply of mixed feeds and more balanced feed rations.

Shift to large-scale specialized livestock farming complexes with advanced automation is underway. Most of the new livestock feeding units are operated under an interfarm system, owned by groups of participating collective farms. The complexes are managed by specialists trained in specific fields of livestock production. Reliance on specialized hog and cattle feeding complexes may actually bolster demand for imported feed. These mechanized complexes need a continuous supply of high energy feeds and lose much of their efficiency if operated below capacity.

Soviet import capacity will also be affected by the adequacy of infra-structural facilities, notably grain storage and transportation facilities.

^{1/} According to USDA estimates a pound of beef in the USSR requires 20 percent more feed than in the US; for pork the figure is 50 percent; for poultry meat the quantity is two and a half times more.

^{2/} Foreign Agriculture (January 5, 1976), p. 9.

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It is estimated that, in 1976, total off-farm storage capacity was about 140-145 million tons, including both grain elevators and warehouses.^{1/} Considering past production figures and contemplated targets of 215-220 million tons for the 1976-80 plan period, it is easy to see that existing facilities are inadequate and contributed to post-harvest losses in the past. To correct the situation the Soviets set a 40-million-ton elevator building program goal over the next five years. This construction plan was subsequently scaled down to 30 million tons. There are doubts among Western analysts that even this lowered construction target will not be achieved by 1980.

There are reports that Russia's physical facilities to handle substantially more grain than 25 million tons are inadequate. Not only is the grain receiving capacity of the ports limited but the movement from dockside to rail car and truck have proved a bottleneck. A further hindrance to large imports is the reported inability of the internal transportation system to move more than 2 million tons a month on a sustained basis.

Trade prospects with Eastern Europe. Indications are that Eastern Europe will not be able to become self-sufficient in feed grains or be able to meet its own protein feed needs in the years ahead. Thus Eastern Europe will remain an important or even could become an expanding market for grains and feeds. In the past the USSR supplied 3 to 3.5 million tons of grain to Eastern Europe.

Future import needs of Eastern Europe will greatly depend on the region's efforts to expand production of livestock products in order to improve consumer diets. The distribution of these imports will be influenced by the Soviet Union's ability to supply the region's grain and feed requirements.

^{1/} State and collective farms had storage facilities for an estimated 100 million tons.

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Aside from Soviet availabilities, Eastern Europe's imports from third countries will be conditioned by (1) competitiveness in prices; (2) credit terms; and (3) ability to export and earn foreign exchange.

Eastern European countries, particularly Poland, expressed interest in establishing trade targets for imports of grains and soybeans from the United States. In an exchange of letters signed in December, 1975, Poland stated its intention to buy from the United States 2.5 million tons of grain a year, plus or minus 20 percent, in each of the next five years. On its part the US stated its intention to supply Poland's demand for American grains, subject to supply availabilities in this country. Moreover, under a new five-year trade protocol, Brazil will annually supply Poland with 500,000 tons of corn, 150,000 tons of soybeans, and 300,000 tons of soybean meal.

An exchange of views on prospects for the development of trade in grains between the US and German Democratic Republic has taken place November 11, 1976. In these discussions the representative of the German Democratic Republic indicated that his country intends to buy between 1.5 to 2 million tons of US grain annually.

The Future of US-Soviet Bloc Trade

Countries with centrally planned economies have cumbersome bureaucratic decision-making processes. Trade is geared to the fulfillment of five-year plan targets and as such is not readily and quickly changed. A major part of uncertainty over possible Soviet grain and other agricultural product purchases stems from the nature of its centrally planned economy. Administrative and political decisions more so than market forces determine the volume of imports. Political elements may also enter in the country distribution of these imports. Thus, the extent to which the difference between planned

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agricultural output and the level of the actual output will be met from imports is a matter of conjecture.

Existing dependence on grain imports from the West is already viewed with increasing concern by the Soviet Bloc leaders. The political and strategic aspects of dependence on grain supplies are as perturbing as the balance of payments concerns. In view of the acute shortage of foreign exchange, grain imports are further reducing the Bloc's ability to purchase Western capital equipment. And, in the case of Eastern Europe, the 1975 Soviet oil price hikes (131 percent) are bound to produce a still tighter pinch on imports from the West.

Under these conditions the balancing of trade bilaterally will remain a prime concern.

At the present, the US has a substantial positive trade balance with the USSR and Eastern Europe that cannot be maintained indefinitely. In 1976 the US trade surplus with Russia was \$2.1 billion and \$1.6 billion in 1975. Western analysts estimate that the USSR's cumulative trade deficit with hard currency countries for 1972-76 was about \$15 billion. A more balanced trade is thus an essential prerequisite for the future growth of East-West trade in general and of US grain and soybean exports in particular.

Lack of US export credit is another underlying trade restraining factor. The USSR and Eastern Europe are looking primarily for CCC export credit and US Export-Import Bank financing. The latter financing hasn't been available to the Russians since December, 1974, when Congress linked them to Jewish emigration from the Soviet Union. Specifically, US financing was made conditional upon Russia's easing its stand on Jewish emigration.^{1/} Not only

^{1/} This stipulation provoked the collapse in January 1975 of the 1972 Soviet-American Trade agreement.

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Export-Import Bank credit but most-favored nation status was linked to Jewish emigration.

Even so the Eximbank, under the terms of the recent amendments can offer only \$300 million in new credits and financial guarantees to the Russians.

Most-favored-nation status would grant to Russians tariff treatment at least as good as that given any other nation. While most-favored-nation status is a key factor in future US-Soviet trade, it would not greatly influence the volume of Soviet exports to the US in the short term. This is because tariffs are comparatively small on minerals and other industrial raw materials figuring importantly in Russian exports. Moreover Russian industrial and consumer goods are generally inferior in quality to those supplied by Western industrial nations and hence find little acceptance by American consumers. On a longer basis growing trade relationships between the US and the USSR will hinge in large part on US willingness to help develop the resources of the USSR's eastern regions. Development of oil and gas facilities in Siberia is reportedly one of the main aims of the next Soviet five-year plan which is now in preparation. The Soviets also expressed willingness to develop trade with small- and medium-sized companies through various forms of compensation agreements.

The US-USSR Grain Supply Agreement

Scope and provisions. The US-USSR grain agreement was signed October 20, 1975 for the purchase and sale of US wheat and corn for supply to the USSR. This Agreement is to run for five years, beginning October 1, 1976 through September 30, 1981.

During the period that this Agreement is in force, the USSR is obligated unconditionally to purchase from the United States each year between October 1 and next September 30 a minimum of 6 million tons of wheat and corn in approximately equal amounts.

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The USSR has the further option to purchase each year of the agreement an additional two million tons of US wheat and corn without consultation provided that total US grain supply for the given year totals at least 225 million tons. Total grain supply in the US is defined as the official USDA estimates of the carry-in stocks of grain plus the official USDA forward crop estimates for the coming crop year. Should US grain supply, excluding rice, fall under 225 million tons the US government may curtail the quantity of exports below the six million ton level.^{1/}

If the USSR wishes to purchase or the US desires to sell more than 8 million tons of wheat and corn in any one year then the quantity of such additional shipments must be agreed upon by the governments of both countries. Thus the 8 million tons is not a ceiling but a point for consultation.

Also, under the agreement, Soviet purchases of wheat and corn will be made for cash at prevailing market prices and in accordance with normal commercial terms. The Soviet foreign trade organization will make purchases from private commercial firms in the United States and must space its purchases over a year as evenly as possible for minimum disruption of prices here. In addition, the Soviets agreed that all wheat and corn purchased from the US will not be reexported and consumed in the USSR.

In return for the Russian purchase commitment, the US agreed not to impose controls on wheat and corn purchased by the USSR.

Effects and implications of the pact. The agreement provides a framework for the orderly trading of US grain with the USSR during the coming five years. Hopefully it should have a steadying influence on food and grain prices at home and on world markets by smoothing out Soviet grain purchases.

^{1/} In view of past crop records it is unlikely that US grain output will ever dip below 225 million tons. Only in 1974, an unusually poor crop year, have total US grain supplies approached this low level.

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The agreement can have broad economic and political impact on both countries. How the agreement will achieve its objectives and who will benefit from it are disputed. It may take several years to find out. At this early juncture, it seems that the outcome will depend largely on good faith and the size of grain crops in the United States and Russia. Clearly the provisions of the agreement can't be enforced by either party. The agreement is simply a commitment that either country can cancel. Overall the agreement can't guarantee stable grain prices. Continued tightness in world grain supplies would perforce rise with or without the agreement. Concurrent large Russian purchases would further accentuate the price rise. But, in years when supplies are abundant, exports to Russia could lessen downward pressure on US prices.

There are several other weaknesses in the agreement that reduces its effectiveness as a stabilization device. A major one is the absence of a definite ceiling on sales to Russia. Under the agreement, Russia could continue to buy US grain even after its purchases reached the upper limit, if US government agrees. Such additional sales would certainly put upward pressure on prices in periods of tight supplies. Moreover, total US grain sales to the USSR could exceed the specified maximum of 8 million tons without prior government consultation. This is because the agreement covers only wheat and corn, leaving unaffected such other grains as barley, oats, sorghum, rye, soybeans, and rice. This limitation has been suspended in an agreement reached in October 1977 permitting the Soviets to buy up to 15 million tons of US grain without further consultations with US officials. Nothing prevents Russia from making large purchases of these grains in the event of crop shortfalls, thereby causing high feed grain prices in this country. The agreement, furthermore, does not cover Soviet grain exports. Thus, at times of bumper crops Russia may export its own grain in amounts equal to that imported from the United States.

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In this situation, Russian imports would have no stabilizing effect on world grain trade. Conceivably, Russia could make the agreement ineffective by offering a price that is too low and unacceptable to exporters. This could result in purchases less than the stipulated minimum quantity of grain or no purchases at all.

A key to stabilizing prices and world grain demand will be Russia's willingness to store grain. This will require the construction of new storage facilities and the accumulation of its own grain stocks in good crop years. Even so, it will take several years to expand storage and accumulate enough grain to carry Russia through a major crop failure without forcing her to reenter the world market on a massive scale.

Despite its obvious weaknesses, the agreement has several advantages for both the US and Russia. For the US, the potential benefit of the grain agreement is the evening of USSR purchases and its stabilizing effect on the domestic grain market. It also fosters the expansion of markets for US grain and provides potential export earnings of about \$1 billion annually. Shipments at the agreed minimum level represent about 15 percent of total US wheat and corn exports. Under present world market conditions, these sales are desirable and necessary if American farmers are to continue full-scale production. Moreover, it makes, to a limited degree, the USSR dependent upon US grain.

For the USSR the major benefit of the grain agreement is that it establishes the country as a regular customer for American grain, receiving the same treatment as other traditional buyers. Also it will help encourage an expansion in Soviet grain storage capacity to store excess grain for use in bad crop years. Additionally the agreement commits the US government to set the rules and trigger point for the imposition of export controls. This is information that is useful

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to both foreign buyers and American producers.

Reaction of the US public to the grain agreement is divided. The majority of farmers see the agreement as a move toward government interference with farm exports by setting limits on the amount of grain that can be sold to a particular country. Furthermore the agreement is seen as setting a precedent for future international commodity agreements.

Consumer groups, too, are divided on the effectiveness of the agreement. Some groups consider the agreement as inconsequential, having no stabilizing effects on US food prices. Others view grain shipments to Russia as a major cause of increasing food prices in this country.

Table 1. Share of USSR, Eastern Europe and the PRC in World Grain Production and Consumption, 1960-1978

Year	1960/61-62/63		1969/70-71/72		1975/76		1976/77		1977/78	
	Production	consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption	Percent of world production/consumption
--Percent--										
Wheat										
Eastern Europe	7.0	9.5	8.0	9.2	8.1	9.5	8.3	10.2	9.1	9.7
USSR	27.8	25.8	28.5	28.5	18.9	24.9	23.4	23.5	23.7	25.1
PRC	7.9	9.6	9.0	10.0	11.4	12.0	10.4	12.3	10.5	12.6
Total CEC	42.7	44.9	45.8	47.8	38.6	46.5	42.2	46.0	43.3	47.5
US	12.8	6.8	12.3	6.5	16.6	5.7	14.1	5.4	14.5	5.9
Corn										
Eastern Europe	8.9	9.1	8.1	8.6	9.4	9.8	8.6	9.7	8.8	9.7
USSR	17.3	12.6	12.6	12.7	10.4	13.0	16.6	17.0	13.1	15.6
PRC	8.9	9.1	9.6	9.6	9.8	9.7	8.9	9.2	9.1	9.2
Total CEC	31.1	30.9	30.3	30.9	29.5	32.6	34.1	35.9	30.9	34.5
US	29.9	27.5	28.2	24.8	29.1	20.9	27.8	19.3	29.5	20.4
Rice										
Eastern Europe	--	0.1	--	0.2	--	0.1	--	0.2	--	0.2
USSR	--	0.2	0.3	0.5	0.5	0.7	0.5	0.7	0.5	0.7
PRC	32.0	31.7	35.1	34.7	35.4	35.8	36.3	35.7	35.5	37.5
Total CEC	32.1	32.1	35.6	35.4	36.0	36.7	36.9	36.5	36.1	38.4
US	1.2	0.6	1.4	0.8	1.6	0.6	1.6	0.6	1.3	0.6
Total grain										
Eastern Europe	6.7	7.5	6.6	7.2	7.2	7.9	7.0	8.0	7.2	7.9
USSR	14.9	14.1	14.9	15.2	10.9	14.0	15.9	15.9	13.8	15.8
PRC	12.9	13.6	14.3	14.4	15.3	15.5	14.2	15.0	14.4	15.1
Total CEC	34.6	35.1	35.8	36.8	33.4	37.4	37.1	38.9	35.5	38.8
US	13.8	16.5	18.6	14.9	20.1	12.6	19.0	11.8	20.0	12.4

Source: Appendix Table.

Table 2. Share of USSR, Eastern Europe and the PRC in World Grain Trade, 1960-1978

	1960/61	1964/65	1965/66	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
<u>West</u>												
<u>Eastern Europe</u>												
Imports	12.8	13.6	11.7	8.5	12.5	9.4	6.5	7.7	6.9	7.5	10.0	6.7
Exports	1.4	0.5	1.5	2.4	1.7	1.6	1.3	2.8	2.5	1.8	2.6	2.4
<u>USSR</u>												
Imports	1.4	4.0	13.8	2.0	0.9	6.3	22.0	6.2	3.8	13.8	6.4	9.9
Exports	11.4	4.0	4.2	11.6	13.5	10.4	1.8	6.9	5.9	0.7	1.4	2.5
<u>PRC</u>												
Imports	4.3	9.2	10.2	6.2	6.8	5.4	7.5	7.7	8.4	3.0	4.4	11.8
<u>Coarse grains</u>												
<u>Eastern Europe</u>												
Imports	4.2	6.3	8.0	6.2	6.8	9.2	7.5	4.7	9.2	7.7	9.4	10.7
Exports	5.0	3.4	2.3	3.0	2.8	1.1	2.2	3.1	1.7	3.3	1.2	2.9
<u>USSR</u>												
Imports	0.8	--	--	0.2	.6	7.7	10.0	8.0	3.9	17.5	6.2	12.9
Exports	4.6	3.7	2.2	2.0	1.7	1.6	0.6	1.1	1.4	--	2.3	--
<u>PRC</u>												
Imports	2.7	1.0	0.2	--	--	0.7	1.2	2.6	0.7	--	--	0.2
<u>Total grains</u>												
<u>Eastern Europe</u>												
Imports	10.4	10.8	10.2	7.4	9.7	9.3	7.0	6.1	8.1	7.6	9.7	8.8
Exports	2.9	1.9	1.9	2.6	2.2	1.4	1.7	2.9	2.1	2.6	1.9	2.6
<u>USSR</u>												
Imports	1.0	2.4	7.9	1.3	0.7	7.0	16.0	7.2	3.8	15.8	6.3	11.5
Exports	10.0	4.0	4.5	7.4	7.8	6.0	1.2	3.8	3.6	0.3	1.9	1.2
<u>PRC</u>												
Imports	3.7	5.8	5.9	5.0	3.5	3.1	4.4	5.0	4.5	1.4	2.0	5.9

Source: Appendix Table.

Table 3. Origin of USSR Wheat Imports and Destination of Wheat Exports, 1960-1976

	Percent imports obtained from:					Percent of exports shipped to:				
	United States	Canada	Australia	Argentina	France	Eastern Europe	Eastern Europe	North Korea	Western Europe	Unspecified
1960	--	--	--	--	--	--	74.0	1.0	1.0	6.0
1964	24.5	53.3	19.2	1.4	--	--	83.0	--	13.1	0.4
1965	--	51.9	19.4	11.9	13.0	2.6	68.9	--	17.1	13.8
1969	--	78.9	--	--	--	23.6	60.3	2.1	6.2	14.3
1970	--	88.5	--	--	--	--	76.2	5.2	6.7	5.2
1971	--	78.4	12.0	--	8.6	--	69.8	1.9	5.3	15.8
1972	29.8	49.3	5.9	--	6.6	2.5	74.6	4.0	11.2	9.3
1973	64.7	23.2	5.5	--	2.2	2.2	62.0	4.3	10.0	21.8
1974	48.8	15.1	21.4	7.6	--	4.3	58.8	3.4	7.5	30.1
1975	41.6	24.0	12.9	8.8	--	11.5	69.2	7.9	15.1	2.1
1976	30.6	30.4	18.8	14.3	--	5.2	--	26.3	48.1	0.7

Table 4. Origin of USSR Coarse Grain Imports and Destination of Coarse Grain Exports, 1960-1976

	Percent of imports obtained from:					Percent of exports shipped to:						
	United States	Canada	Australia	Argentina	France	Eastern Europe	Eastern Europe	North Korea	Cuba	Western Europe	Japan	Unspecified
1960	--	--	--	14.7	--	80.2	61.7	--	--	38.2	--	--
1964	--	--	--	--	--	--	70.8	--	16.8	12.3	--	--
1965	--	--	--	--	--	--	77.1	3.7	6.7	12.1	--	0.2
1969	--	--	--	27.4	--	--	67.1	--	12.3	16.8	--	3.7
1970	--	--	--	--	3.2	--	57.2	--	24.0	18.1	--	0.7
1971	--	--	--	16.3	19.7	--	62.6	--	16.5	18.8	--	2.0
1972	65.1	9.2	--	--	10.5	--	64.9	--	17.1	3.1	--	14.9
1973	63.4	7.7	--	--	11.7	4.4	81.9	--	18.0	--	--	--
1974	63.7	1.0	--	10.4	3.2	0.4	50.6	--	9.7	--	--	39.4
1975	49.2	11.8	--	14.1	3.0	2.6	52.2	--	14.1	2.7	--	30.9
1976	71.0	7.6	--	2.1	2.4	2.8	77.4	--	22.3	--	--	--

Appendix Table 1. Grain Production, Consumption, and Net Exports: World, United States, USSR, Eastern Europe and PRC, 1960/61-1977/78

	1960/61-62/63				1969/70-71/72				1975/76				1976/77				1977/78			
	Pro- duc- tion	Con- sump- tion	Net trade	Produc- tion	Consump- tion	Net trade	Produc- tion	Consump- tion	Net trade	Produc- tion	Consump- tion	Net trade	Produc- tion	Consump- tion	Net trade	Produc- tion	Consump- tion	Net trade	Produc- tion	Consump- tion
--Million tons--																				
Wheat																				
Eastern Europe	16.9	22.7	- 5.5	26.2	31.0	- 4.6	28.5	33.6	- 3.6	34.5	38.3	- 4.7	34.5	38.5	- 4.0	34.5	38.5	- 4.0	34.5	38.5
USSR	67.2	61.8	5.0	92.8	96.0	- 4.8	66.2	87.8	- 9.6	96.9	88.4	- 3.5	90.0	99.0	- 6.0	90.0	99.0	- 6.0	90.0	99.0
PRC	19.2	23.0	- 3.8	29.7	33.7	- 3.9	40.0	42.2	- 2.2	43.0	46.1	- 3.1	40.0	49.5	- 9.5	40.0	49.5	- 9.5	40.0	49.5
Total CPC	103.2	107.5	- 4.3	148.8	160.7	- 3.7	134.7	163.7	- 15.4	174.4	172.8	- 11.3	164.5	187.0	- 19.5	164.5	187.0	- 19.5	164.5	187.0
US	33.4	16.3	18.1	40.0	21.9	17.4	58.1	20.1	31.5	58.3	20.4	25.4	55.1	23.3	29.6	55.1	23.3	29.6	55.1	23.3
World	231.2	239.5	--	324.6	335.8	--	348.9	351.6	--	413.4	375.7	--	379.6	394.0	--	379.6	394.0	--	379.6	394.0
Coarse grains																				
Eastern Europe	39.6	40.6	- 1.0	47.4	50.3	- 2.7	59.4	62.4	- 3.7	59.4	65.3	- 7.0	60.0	65.4	- 6.0	60.0	65.4	- 6.0	60.0	65.4
USSR	59.0	56.2	2.5	73.8	74.7	- .5	65.8	82.4	- 15.6	115.0	114.5	- 3.5	90.0	106.0	- 10.0	90.0	106.0	- 10.0	90.0	106.0
PRC	39.9	40.6	- .7	56.7	56.8	- .1	62.0	61.9	.1	62.0	61.9	.1	62.0	62.1	-.2	62.0	62.1	-.2	62.0	62.1
Total CPC	138.5	137.4	.7	177.9	181.7	- 3.3	187.2	206.7	- 19.2	236.4	211.6	- 10.5	212.0	233.4	- 16.1	212.0	233.4	- 16.1	212.0	233.4
US	132.0	122.5	13.6	165.8	145.8	20.2	184.4	133.0	49.3	192.7	139.9	50.0	201.9	138.0	48.5	201.9	138.0	48.5	201.9	138.0
World	444.6	444.8	--	567.3	568.2	--	634.4	634.6	--	692.3	672.5	--	684.1	677.0	--	684.1	677.0	--	684.1	677.0
Rice^{1/}																				
Eastern Europe	.08	.25	- .16	.14	.37	- .22	.15	.38	- .21	.13	.42	- .32	.15	.38	- .23	.15	.38	- .23	.15	.38
USSR	.15	.33	- .18	.83	1.10	- .28	1.31	1.63	- .32	1.30	1.63	- .33	1.37	1.69	- .33	1.37	1.69	- .33	1.37	1.69
PRC	51.64	51.21	.63	73.60	72.67	.94	86.02	85.26	.76	85.34	84.84	.50	86.70	86.20	.50	86.70	86.20	.50	86.70	86.20
Total CPC	52.07	51.79	.29	74.57	74.14	.44	87.48	87.27	.23	86.77	86.89	-.15	88.21	88.27	-.06	88.21	88.27	-.06	88.21	88.27
US	1.33	.95	.98	2.88	1.66	1.27	4.08	1.39	1.74	3.82	1.59	2.11	3.23	1.48	2.22	3.23	1.48	2.22	3.23	1.48
World	162.10	161.30	--	209.61	209.21	--	243.00	237.90	--	234.90	237.70	--	244.30	229.80	--	244.30	229.80	--	244.30	229.80
Total grain																				
Eastern Europe	56.6	63.5	- 6.6	73.8	81.6	- 6.8	88.0	96.4	- 7.6	94.0	104.0	- 12.0	94.7	104.3	- 10.2	94.7	104.3	- 10.2	94.7	104.3
USSR	126.3	119.0	7.3	167.4	171.8	- 4.0	133.4	171.8	- 25.5	213.2	204.5	- 7.3	181.4	207.7	- 17.3	181.4	207.7	- 17.3	181.4	207.7
PRC	110.9	114.8	- 3.9	150.0	163.1	- 3.1	188.0	189.3	- 1.3	190.3	182.8	- 2.6	188.7	197.5	- 8.9	188.7	197.5	- 8.9	188.7	197.5
Total CPC	293.8	297.3	- 3.3	401.3	416.5	- 5.9	409.4	457.6	- 34.3	497.5	501.2	- 21.9	484.7	509.4	- 36.3	484.7	509.4	- 36.3	484.7	509.4
US	168.3	139.8	32.7	208.7	169.0	39.3	246.6	154.5	82.6	254.8	151.9	77.5	262.1	162.8	81.6	262.1	162.8	81.6	262.1	162.8
World	847.9	845.6	--	1,119.8	1,131.5	--	1,226.1	1,224.1	--	1,340.6	1,285.9	--	1,308.1	1,310.9	--	1,308.1	1,310.9	--	1,308.1	1,310.9

1/ Milled rice

Source: U.S. Department of Agriculture, PRS, World Agricultural Situation WAS-15, December 1977, pp. 38-42.

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Appendix Table 2. Grain Trade: Eastern Europe, USSR and PRC, 1960/61-1977/78												
	1960/61	1964/65	1965/66	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77 ^{1/}	1977/78 ^{2/}
	--Million tons--											
Area^{1/}												
Eastern Europe												
Imports	5.6	7.4	7.2	4.7	6.7	5.2	4.6	5.6	4.7	5.5	7.0	4.4
Exports	0.6	0.3	0.9	1.3	0.9	0.9	0.9	2.0	1.7	1.3	1.8	1.9
Balance	5.0	7.1	6.3	3.4	5.8	4.3	3.7	3.6	3.0	4.2	5.2	2.5
USSR												
Imports	0.6	2.2	8.5	1.1	0.5	3.5	15.6	4.5	2.5	10.1	4.5	8.0
Exports	5.0	2.2	2.6	6.4	7.2	5.8	1.3	4.0	0.5	0.5	1.0	1.0
Balance	-4.4	--	5.9	-5.3	-6.7	-2.3	14.3	-0.5	-1.5	9.6	3.5	7.0
PRC												
Imports	1.9	5.0	6.3	5.1	3.7	3.0	5.3	5.6	5.7	2.2	3.1	9.5
World exports	43.9	54.4	61.6	55.2	53.4	55.6	70.8	72.6	68.0	73.1	70.0	80.3
Coarse grains												
Eastern Europe												
Imports	1.1	2.4	3.8	2.9	3.6	5.1	5.2	3.8	6.4	6.8	8.5	10.1
Exports	1.3	1.3	1.1	1.4	1.5	0.6	1.5	2.5	1.2	2.9	1.1	2.3
Balance	1.1	1.1	2.7	1.5	2.1	4.5	3.7	1.3	5.2	3.9	7.4	7.8
USSR												
Imports	0.2	--	--	0.1	0.3	4.3	6.9	6.5	2.7	15.5	5.5	11.0
Exports	1.2	1.4	2.2	0.9	0.9	0.9	0.4	0.9	1.0	0.0	2.0	1.0
Balance	-1.0	-1.4	-2.2	1.8	2.1	3.5	6.6	5.6	1.7	15.5	3.5	10.0
PRC												
Imports	0.7	0.4	0.1	--	--	0.4	0.8	2.1	0.5	--	--	0.2
World	26.0	37.8	47.7	47.1	53.3	55.5	69.0	80.9	69.5	88.5	88.5	85.1
Total grains												
Eastern Europe												
Imports	7.3	10.0	11.1	7.6	10.3	10.3	9.0	9.4	11.1	12.3	15.5	14.5
Exports	5.0	1.8	2.1	2.7	2.4	1.5	2.4	4.5	2.9	4.2	3.0	4.1
Balance	5.3	8.2	9.0	4.9	7.9	8.8	7.4	4.9	8.2	8.1	12.5	10.4
USSR												
Imports	.7	2.2	8.6	1.3	.8	7.8	22.5	11.0	5.2	25.6	10.0	19.0
Exports	7.0	3.7	4.9	7.6	8.3	6.7	1.7	5.9	5.0	0.5	3.0	2.0
Balance	-6.3	-1.5	-2.7	-6.3	-7.5	1.2	20.8	5.1	0.2	25.1	7.0	17.0
PRC												
Imports	2.6	5.4	6.4	5.1	3.7	3.4	6.1	7.7	6.2	2.2	3.1	9.7
World	65.9	92.4	109.0	102.3	106.7	111.1	139.8	153.5	137.5	161.6	158.4	165.4

Source: U.S. Department of Agriculture, FMS, Foreign Agriculture Circular Grains FO-24-77, December 1977, pp. 32-33.

^{1/} Preliminary^{2/} Projection

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Appendix Table 3. USSR Livestock Numbers, Total Grain Production, Utilization, and Trade, 1960-1977

Year begin- ning July 1	Production		Net grain trade ^{3/}	Utilization		Hog numbers ^{4/}	All cattle	Chickens
	Wheat	Coarse Grains ^{1/} Total grain ^{2/}		Feed	Total			
				--Million metric tons--				
1960	64.3		- 6	42	122	53.4	74.2	514.3
1961	66.5	56.0	- 7	45	126	58.7	75.8	515.6
1962	70.8	57.7	- 7	43	127	66.7	82.1	542.6
1963	49.7	46.8	+ 6	33	108	70.0	87.0	550.4
1964	74.7	61.5	- 1	44	131	40.9	85.4	449.1
1965	59.7	50.7	+ 4	56	139	52.8	87.2	456.2
1966	100.5	58.6	- 1	59	144	59.6	93.4	490.7
1967	77.4	58.5	- 4	64	147	58.0	97.1	516.3
1968	93.4	63.4	- 6	72	161	50.9	97.2	528.4
1969	79.9	68.7	- 5	83	177	49.0	95.7	546.9
1970	99.7	74.8	- 7	92	187	56.1	95.2	590.3
1971	98.8	72.6	+ 1	93	180	67.5	99.2	652.7
1972	86.0	72.5	+21	98	187	71.4	102.4	686.5
1973	109.8	101.0	+ 5	105	213	66.6	104.0	700.0
1974	83.9	99.7	.6	107	205	70.0	106.3	747.7
1975	66.2	65.8	+26	89	175	72.3	109.1	792.4
1976	96.9	115.0	+ 7	108	215	57.9	111.0	734.9
1977 ^{5/}	92.0	92.0	+17	115	220	63.0	110.3	795.0 ^{6/}

1/ Includes rye, barley, oats, corn, sorghum, and millet.

2/ Includes wheat, coarse grains, rice, and miscellaneous grains and pulses.

Production is on a "bunker weight" basis; not discounted for excess moisture and foreign material.

3/ Minus indicates net exports or draw-down of stocks.

4/ January 1.

5/ Preliminary.

6/ Estimate.

Source: U.S. Department of Agriculture, Foreign Agriculture, March 15, 1976, p. 8 and U.S. Department of Agriculture, USSR Agriculture Situation and Review of 1976 and Outlook for 1977, FAER-132, p. 14.